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Project Title : **Virtual Business Center Subsystem**

Final Year Project Phase II

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Moderated by

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ABSTRACT

This report covers the overall specification development of Virtual Business Center subsystem. The main objective of this project is to develop an e-commerce website that can cater for the online purchase-selling processes specifically for student. With this system we introduce a unique feature of the system – Prepaid Token System.

The first chapter of this report is to explain briefly an introduction to the whole system – E-Market. It covers overview of the project, problems specification, its objectives, project scope, expected outcomes and project schedules. Chapter two will covers the literature review. This part discusses the topic like case study on the existing system on the internet, the definition of the e-commerce term, the workflow technology, scripting technology, hardware and software study and security issue had been looked at. Chapter three will discuss the V model where have been used to develop this system. Chapter four focused on the system analysis and the requirements identified based on the problem specification defined earlier. The last chapter here will cover the system architecture design, database design, flow chart and the interface design.

The language that I am using in this system is ENGLISH. English is a language that will become more and more common around the world.

This system is target to the local universities student that is not afford to have their own credit card. I think all the local university should incorporate with this advance system to let their students share this advance feature.

ACKNOWLEDGMENTS

During the duration of the development of this project, I would like to thanks to some people have been leading, helping, encouraging, advising to me in order to finish this project.

Firstly, I am particular indebted to Encik Md. Nor Ridzuan Daud who is supervised this project. His give me a lot of advises, guidance, expertise and time during the process of development. His gives a lot of flexibility to me where really can reducing the pressure doing this final year project.

I also would like to express my gratitude to my project moderator, Prof. Madya Dr. Syed Malek Fakar Duani. His give me many advices during the Viva section. I learn a lot of things that is very useful for me in the future.

Lastly I would like to say thank you to my partner Mr. Theng Koon Liang, who is in the same team with to develop this project. We spend a lot of time to explore this ideal and really his give me a lot of good and essential point during the development process.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 Chapter 1 – Introduction

1.1 Overview

Electronic Commerce used an electronic form to implement any business process through network. Electronic commerce is much broader and encompasses many more business activities than just web shopping. Some people is using the term electronic business when they talking about electronic commerce.

E-Market is an ideal from me and my partner that is a system similar to the integration of e-Procurement and virtual trading center. This system provides a good and wide opportunity for students (as supplier) to advertise and sell their second hand products and students (as buyer) to buy second products from supplier or sellers. E-Market provides auction activities and purchase-selling used books among student.

The main powerful unique feature that provide by the E-Market system is the electronically making payment — Electronic payment. Electronic payment allows payment to be made through prepaid token system. This ideal is similar to a user who buys a prepaid reload card and applying a few simple steps to reload the air time credit of the mobile phone. Prepaid token system is specifically designed for student's sake, and the users (students) are needs to buy a reload card at any specified places in order to doing the selling-buying process through the net. The reason why introduce this prepaid token system

to the student because most of the local universities students don't have the credit card.

E-Market system consists of six modules, namely supplier management, customer management module, financial management module, user management module, trading module and auction module.

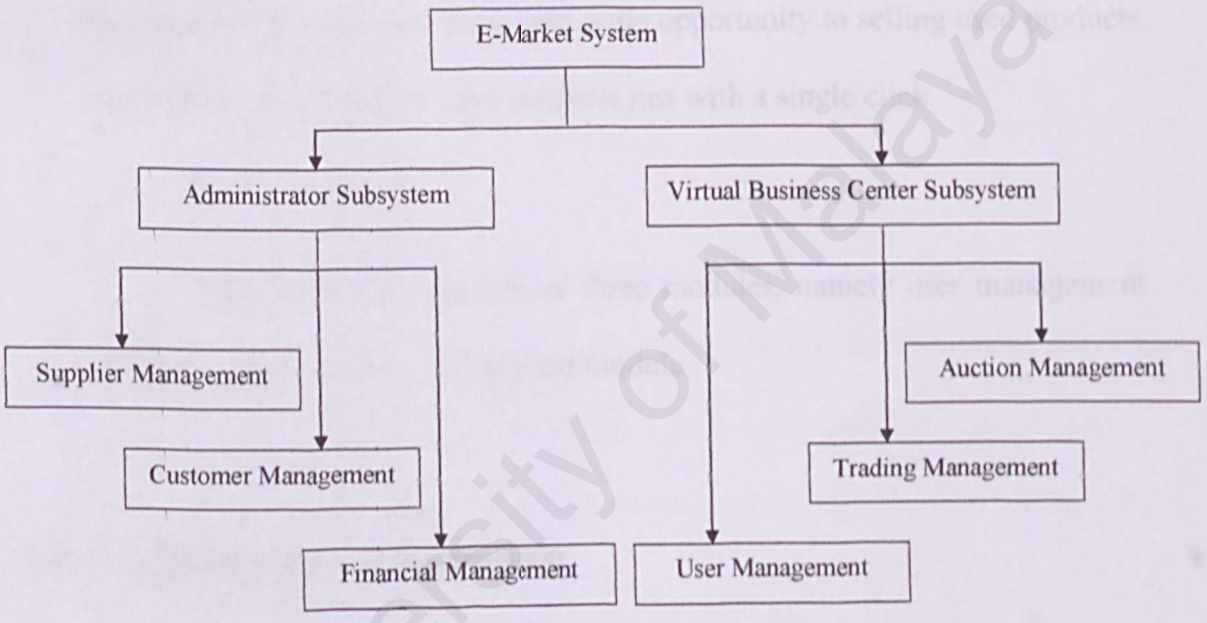

Figure 1.1 E-Market System Diagram

1.2 Introduction Virtual Business Center Subsystem

Virtual Business Center Subsystem is my final year project title. Chosen development for this subsystem is because I realized that many of the local universities students are difficulty to sell their used text books and used products and who facing the financial problems always difficult to get the used text books to minimize the financial burden. So, this subsystem is provides a

place for students (buyers and sellers) to meet and do their buying and selling processes. They may just sit down at home and browsing the net and they can easily do the buying and selling process among the students.

This Subsystem provides a wide opportunity for sellers to advertise and sell their second hand products and buyers to buy second hand products from supplier or sellers. If all students make use to this coming Virtual Business Center web site, it's a very wide opportunity to selling used products and buying some cheaper used products just with a single click.

This Subsystem consists of three modules, namely user management module, trading module and auction module

1.2.1 User Management Module

The prime function of this module is to assist administrator to organize users' particulars in an efficient manner. This module stores personal profile for student or potential user who will be the end-user to this system.

1.2.2 Auction Module

Auction module provides a virtual auction scene on web sites. It allows bidder to compete for their desirable products without traveling to auction center.

1.2.3 Trading module

This is a fascinating module which is designed to cater for the needs of users. Available features including updated catalogue, newest bulletin and special product request form. This module also provides searching feature that allow users to search their interest used products and the buying and selling process will incur here.

1.3 Project Motivation

1.3.1 Current situation

Undergraduates have long been hampered by financial burden of purchasing expensive textbooks as consequence of shipping charges that incurred. Moreover, most textbooks are only applicable for short period, a semester or a term. Likewise, undergraduates who intend to sell their used textbooks can hardly find their way out.

Similar problem is also applicable to other used products, which is important for undergraduates as auxiliary necessity.

In most of the local universities' campus, there has been no used bookshop that is able to assist students in buying used textbooks. Owing to limited social circle of students, they always find the difficulties in buying and selling used textbooks at a lower price. Without a general platform to

exchange information, purchasing used textbooks with cheap price seems to be a difficult task.

Currently available online shopping web sites likes amozon.com, buysell.com and etc. are specifically established to suit the favor of working personnel with stable financial ability. For instance, these web sites will require payment in the mode of banking transaction by using credit cards, which most of the undergraduates lacking. This situation presents a problem to undergraduates who intend to do their purchasing through those web sites.

1.3.2 Solution for the Current Situation

By introducing the Virtual Business Center Subsystem system, it is expected to resolve those mentioned problems. Virtual Business Center Subsystem will offer a centralized platform for undergraduates to exchange information on selling and purchasing used products. Moreover this market place integrates several choices of same used products at one time, which then allow purchaser to make comparison. Therefore Virtual Business Center Subsystem is able to cultivate the concept of wise consumer within undergraduate.

Since the Virtual Business Center Subsystem system is focusing on the welfare of undergraduates, who are financially incapable (i.e. do not possess credit card), the prepaid token system will enable undergraduates to purchase

desirable used products without credit card. In addition, used products are selling at reasonable price.

1.4 Project Objectives

- With the electronic form of transaction can reduce paper usage and the transaction cost that occur in the business transaction processes.

- Promote small-scale enterprise which is labor-efficient and time-saving and offers secure online payment by using prepaid token system.

- Provides an electronic virtual center to undergraduate who are interested in purchasing and selling used reference books and used product.

- Promotes wise consumption idea among students in purchasing reference books.

- Encourages respect for intellectual property through purchasing genuine text books with lower prices, and thereby reduce piracy among undergraduates.

- Provides an electronic market place to enable savings in term of money and time for undergraduates.

1.5 Project Scope and Expected Outcome

Generally, E-Market can be divided into six modules, which are supplier management module, customer management module, financial management module, auction module, trading module, user management module.

1.5.1 Project scope of user management module

- Develops a web-based management system to manage user particulars.
- Provides online registration for new users.

1.5.2 Expected outcomes of user management module

- Allows users to update their personal particular.
- Allows users to view their own account profile.
- Allows users to top up their prepaid token account.

1.5.3 Project scope of auction module

- Develops a web-based management system to manage auction.
- Provides an electronic market place for auction.

1.5.4 Expected outcomes of auction module

- Allows web-based auction to take place.
- Automated inter-exchange of successful bidder's and owner's contacts.

- Promotion of auction's product.

1.5.5 Project scope of trading module

- Develops a web-based management system to manage electronic market place.
- Creates user friendly electronic market place
- Provides online catalogue for user viewing.
- Provides online newest bulletin to acknowledge user.
- Provides online request form.
- Provides secured online payment.

1.5.6 Expected outcomes of trading module

- Allows online purchasing.
- Allows particular request from users to purchase desirable books.
- Allows simple payment through prepaid token system which is feasible for students.

1.6 Project Schedule

Table 1.1 Project Schedule

Project Stage	June				July				August				Sept				Oct				Nov				Dec				Jan
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1
Preliminary Study and Planning																													
Literature Study																													
Requirement Analysis																													
System Design																													
Documentation Phase I																													
Program Design																													
Coding																													
Unit & Integration Testing																													
System Testing																													
Acceptance Testing																													
Implementation and Maintenance																													
Documentation Phase II																													

2 Chapter 2 – Literature Review

2.1 Comparison with Exiting System

2.1.1 Case Study on BuySell.com (www.buysell.com.my)

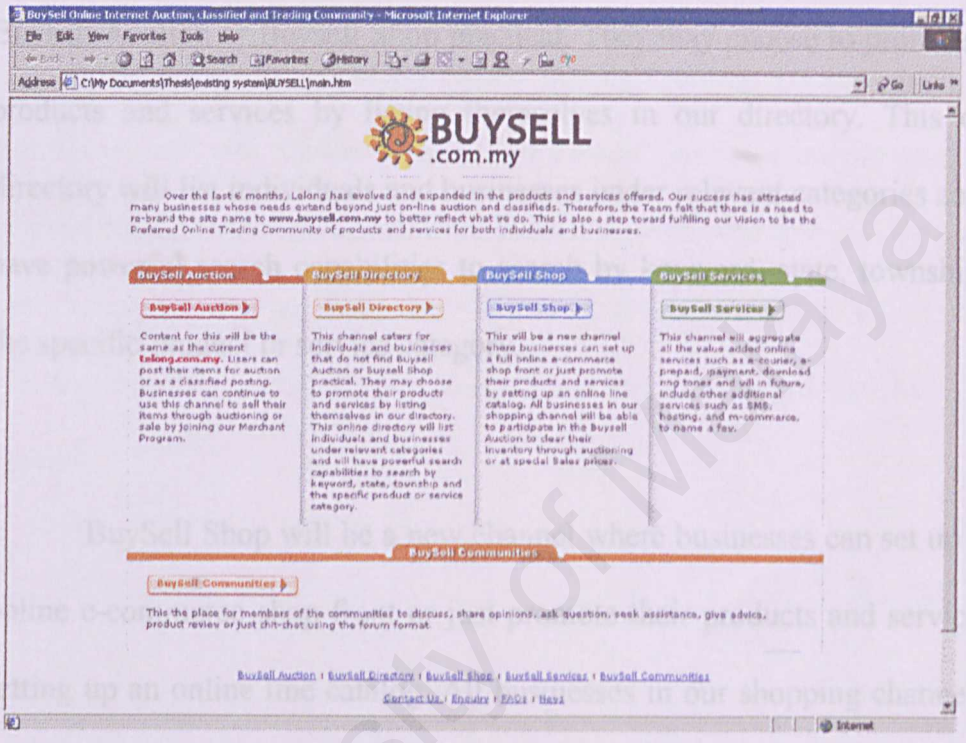

Figure 2.1 Home Page for BuySell.com

Previously BuySell.com is calling Lelong.com. There re-brand the site name to BuySell.com which have a better reflect to what their do and fulfilling their vision to be the Preferred Online Trading Community of products and services for both individuals and businesses.

Basically this web site has five main modules namely BuySell Auction, BuySell Directory, BuySell Shop, BuySell Services and BuySell Communities.

2 Chapter 2 – Literature Review

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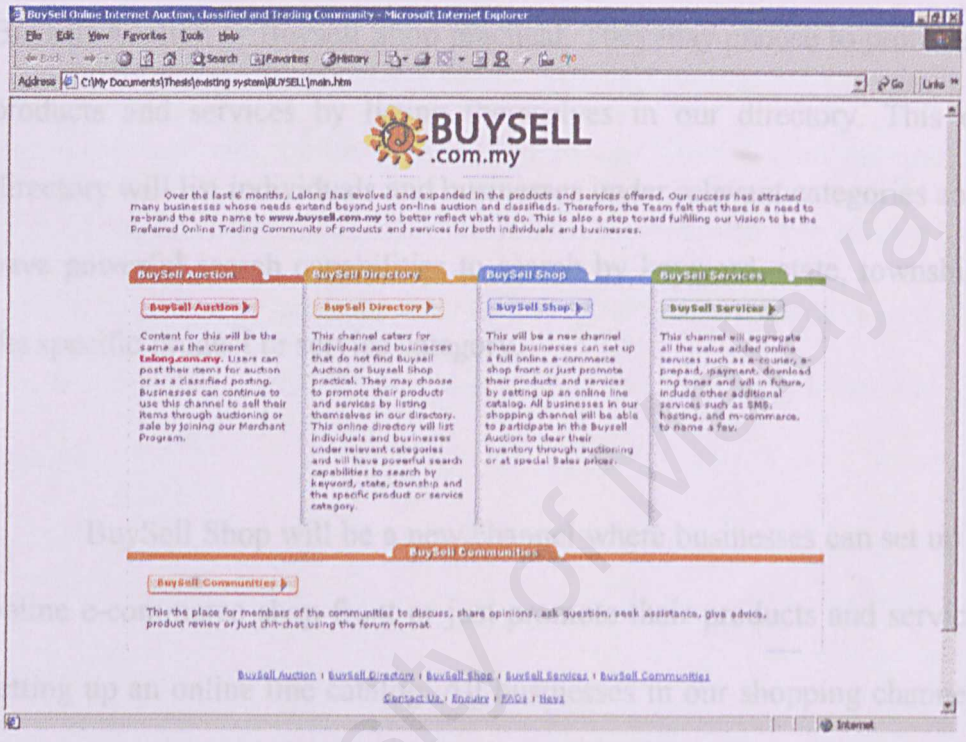

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Basically this web site has five main modules namely BuySell Auction, BuySell Directory, BuySell Shop, BuySell Services and BuySell Communities.

BuySell Auction allows users post their items for auction or as a classified posting. Businesses can continue to use this channel to sell their items through auctioning or sale by joining our Merchant Program.

BuySell Directory caters for individuals and businesses that do not find Buysell Auction or Buysell Shop practical. They may choose to promote their products and services by listing themselves in our directory. This online directory will list individuals and businesses under relevant categories and will have powerful search capabilities to search by keyword, state, township and the specific product or service category.

BuySell Shop will be a new channel where businesses can set up a full online e-commerce shop front or just promote their products and services by setting up an online line catalog. All businesses in our shopping channel will be able to participate in the Buysell Auction to clear their inventory through auctioning or at special Sales prices.

BuySell Services will aggregate all the value added online services such as e-courier, e-prepaid, ipayment, download ring tones and will in future, include other additional services such as SMS, hosting, and m-commerce, to name a few.

Lastly BuySell Communities allows members of the communities to discuss, share opinions, ask question, seek assistance, gives advice, product review or just chit-chat using the forum format.

2.1.2 Conclusion

This web site provides online buying, selling, biding, built up e-commerce web site, online auction and forum. BuySell.com provides much type of products including the used products. This web site allows users to user their credit card to do all the business or non-business transaction through the net. But for a student who don't have the credit card can not buying process.

2.1.3 Case Study on CampusBooks.com (www.campusbooks.com)

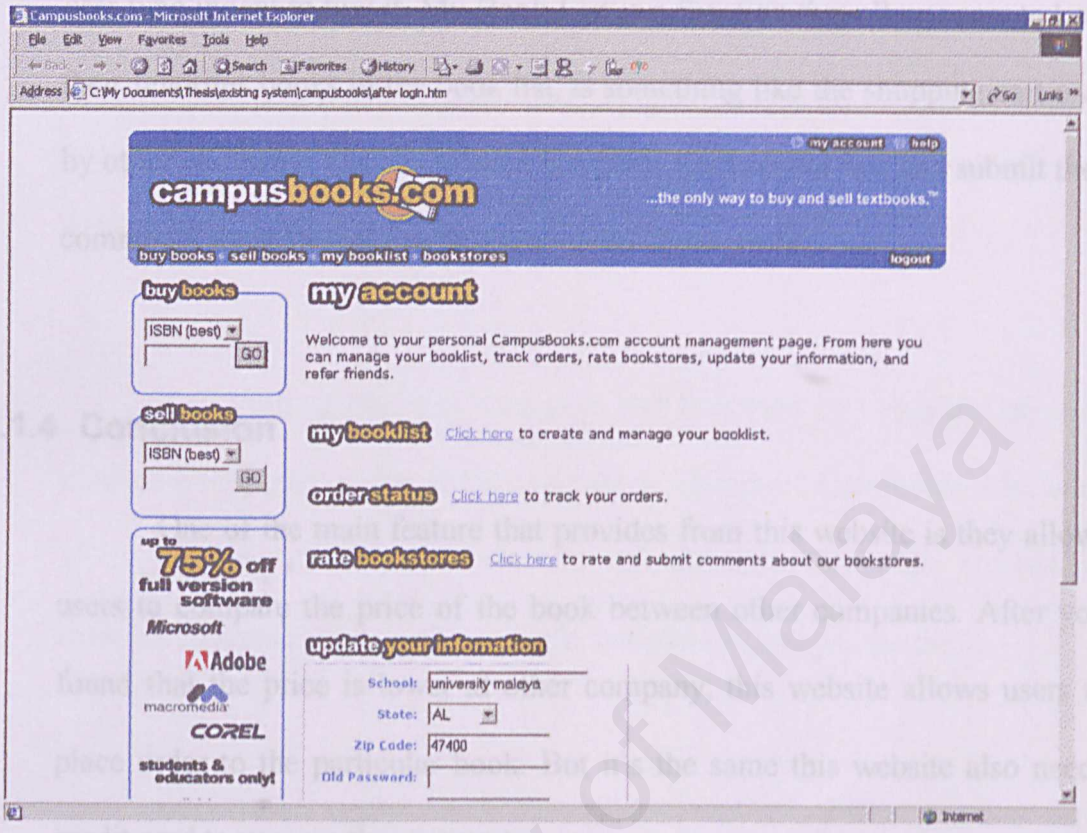


Figure 2.2 CampusBooks.com Web Site

CampusBooks.com website only provides buying and selling books (news and used books) but not including product other than books. This website allows users to manage personal CampusBooks.com account, booklist, track orders, rate bookstores, update personal information, and refer friends. Beside from allow users manages the personal account, basically this website also provides few functions which is Buy Books, Sell Books, My Book List, and Book Store.

Buy Books Function allows users to buy a reference books from the website. Sell Books function allow user to sell their used books to any other user who indent to buy it. My Book List is a function that allow users to keep their favorites books in the book list, is something like the shopping cart used by other company. The Book Store is a place lets users to rate and submit their comments about the service that provide by the website.

2.1.4 Conclusion

One of the main feature that provides from this website is they allows users to compare the price of the book between other companies. After you found that the price is lower at other company, this website allows users to place order to the particular book. But it's the same this website also needs credit card to process the payments.

2.2 E-Commerce System Architecture Characteristic

2.2.1 Electronic Commerce Definition

One possible definition of Electronic Commerce would be; "any form of business transaction in which the parties interact electronically rather than by physical exchanges or client contact." [1]

Any form of business exchange that is occurs by using the network transmission electronically we considered as Electronic Commerce. This kind of the business exchange via the network occurs between the companies, between customers and companies or between users and companies.

Electronic Commerce is a means of enabling and supporting such changes on a global scale. It enables companies to be more efficient and flexible in their internal operations, to work more closely with their suppliers, and to be mere responsive to the need and expectations of their customers. It allows companies to select the best supplier regardless of their geographical location and to sell to global market. Electronic Trading is a special case in which a supplier provides goods or services to a customer in return is for payment. Electronic retailing is special case of electronic trading where the customer is an ordinary consumer rather than another company. However, while these special cases are of considerable economic importance, they are just particular example of the more general case of any form of business operation or transaction conducted via electronic media. Other equally valid examples include internal transaction within company or provision of

information to an external organization without change. Electronic Commerce is technology for change. Companies that choose to regard it only as an "add on" to their existing ways of doing business will gain only limited benefit. The major benefit will accrue to those companies that are willing to change their organization and business process to fully exploit the opportunities offered by Electronic Commerce.

2.2.2 The Scope of Electronic Commerce

Electronic Commerce encompasses a broad range of activities. The core component is addressing the commercial transaction cycle. Electronic Commerce includes electronic trading of physical goods and services and of electronic material. It also includes the advertising and promotion of products and services and of contacts between traders, the provision of market intelligence and support for shared business processes. The invoicing and payment cycle can be supported electronically. Dealing with public authorities electronically for customer and tax affairs and in statistics is already well developed. However, a number of issue such as security, legal question and procedures still have to be addressed as part of electronic commerce business environment. A distinction should be made between electronic trading of physical good and service and electronic trading of information-based contents that can be delivered directly through the network (i.e. images, voice, text, software...). The electronic trading of physical goods and services represent an evolution of present of way of trading, capitalizing on new possibilities offered by technology to improve efficiency in terms of lower costs, effectiveness in terms of widening market potential and better meeting

customer's needs as well as providing a means of enhanced product and service innovation notably through customer-supplier interaction. This form of Electronic Commerce is expected to have a great impact on competitiveness and a limited impact on employment. The trading of electronic material (e.g. software, video, music, images, multimedia works games, etc.) represents a revolutionary new way of trading, for which the full commercial transaction cycle can be conducted simultaneously via the same network (including delivery), implying specific requirements regarding the proper integration of payment, etc. Depending on the solutions that will successful in the market place, traded electronic goods could create totally new markets and revolutionize some industries such as publishing impact on competitiveness and create employment. Contact between companies can be facilitated by on-line business directories and improve national and regional information relay center. Contact companies and consumers can be supported by various means, including on-line advertising and shopping, including technique specification, guidance an use and answers to common questions, supported by comprehensive navigation and search facilities.

2.2.3 Electronic Commerce Activity

Electronic Commerce activity is currently limited to mainly publishing business opportunity (on-line advertising), Internet auction and catalogue-based sales (on-line shopping). An ideal model of current E-Commerce activity could comprise the following nine steps [1].

1. Intranet and externally with the Internet. A basic web presence to draw potential customer to company
2. Interactive with customer through email, bulletin boards and on-line catalogues
3. On-line credit cards orders
4. On-line customer service and supports
5. The profiling of customers to identify needs and issues
6. Front office integration with company's web site
7. Back office integration with company's web site
8. Integration with third party suppliers
9. Complete integration with a company's supply chain

At the moment, most European and Asian companies are stuck at step three and every few companies, even in the US have reached step nine. Even though the industries as a whole as far from achieving the ideal current model of E-Commerce, there are some shortcomings of this current model in that they have not fully explored the potential of Internet capabilities in the context of information filtering intelligence macro-dynamic behavior and user driven optimization ability, with its foundation in computers and communication integration, also poses a business model beyond the traditional face-to-face transaction model between consumers and merchants. The Internet E-Commerce extension could allow multiple merchant-consumer relationship through collaboration at a global common market place infrastructure in an open free market economy model [2].

2.2.4 E-Commerce Categories

E-Commerce can be sub-divide by four distinct categories:

1. Business to Business. Category would be a company that uses a network for ordering from its suppliers, receiving invoices and market payments. This category has been well established for several years particularly using Electronic Data Interchange (EDI) over private or value-added networks.
2. Business to Consumer. Category largely equates to electronic retailing. This category has expanded greatly with the advent at the World Wide Web. There are now shopping malls all over the Internet offering all manners of consumer goods from cakes to computer and motorcars.
3. Business to Administration. Category covers all transaction between company and government. For example, in USA the debits of forthcoming government procurements are published over the Internet and company can respond electronically. Currently this categories is in its infancy, but it could expand quite rapidly as government use this own operation to promote awareness and growth of Electronic Commerce.
4. Consumer to Administration. Category has not yet emerged. However in the wake of growth of both the Business to Consumer and Business to Administration categories, government may expand electronic interaction to each areas as well as welfare are payments and self-assessed tax returns [3].

2.3 Network

A network is nothing more than two or more computers connected together by a cable so that they can exchange information. There is a few types of network can be considered to be used in this project: LAN, WAN, internet, intranet and extranet.

2.3.1 Local-Area Network (LAN)

A LAN is a connection between two or more computers, which allows users to share files, programs, or data with a minimum of effort. A LAN is usually local; this means that the machines are located in one physical location -- like a building or just one floor of a building. A LAN tends to use just one set of networking options. For example, a LAN generally uses one network operating system, one type of cable, and one logical topology. A LAN is usually set up for a small group of people such as a department or a division. A LAN is not limited to any particular computer operating system. DOS, Macintosh, and UNIX can all run across a LAN. Actually, they can all run across the same LAN at the same time, if the right software is used.

2.3.2 Wide-Area Network (WAN)

While the geographic distinctions of "local" and "wide" area networks imply a difference in the distance between network nodes that is not always the case. By definition, a Wide Area Network (WAN) is a government-regulated public network or privately owned network that crosses into the

public network environment. It doesn't matter whether the area being bridged is across the country or across the street. If the geographical separation crosses over a public thoroughfare, a WAN is required to make the connection.

The WAN is typically used to connect two or more local area networks (LANs). As you know, a LAN is a privately owned communications system that is designed to allow users to access and share resources (computers, printers, servers) with other users. LANs that are interconnected by a WAN may be located in the same geographical area, such as an industrial park or campus setting, or in geographically separate areas, such as different cities or even different regions.

2.3.3 Internet

Internet is one of the fastest growing forms of the network connection. The Internet is a worldwide network with thousands of computer and millions of the user. In the last few years, we have seen all type of organization using the Internet and World Wide Web as an international data highway. The Internet is not a one network but thousands of networks all over the world working together, the concept pf which is making a request and server delivery the answer.

In other words, the Internet refers to outward-facing system with little or one connection to any other Internet system to become a general-purpose broadcast medium for corporate marketing material.

2.3.4 Intranet

The Intranet is an inward-facing or staff-facing system. Intranet have some similarities of Internet-based web sites, starting out as departmental, including email system based document as well as access to existing system and data repositories.

An Intranet has two fundamental functions:

- Provide secure, customized access to relevant, up to-date information found in transaction system.
- Let users act on that information by managing how it flows through process system.

These Applications are used within and across workgroup to manage product development, human resources, sales force automation and other internet business process.

2.3.5 Extranet

Extranet refers to the marriage or combination of these two otherwise separate systems into a single, seamless system – a market-facing system. For example, in an extranet, a customer service system faces both inward towards the customer service personal and management as well as outward towards the customers themselves; enjoy a similar level of interactivity and security as an internal participant.

As the extranet itself evolves, it extends not only data but actual transactions to the internet to conduct electronic commerce (E-Commerce). Similarly, it lends itself to internal global organizational integration by sharing internal and external data with process that span all existing system.

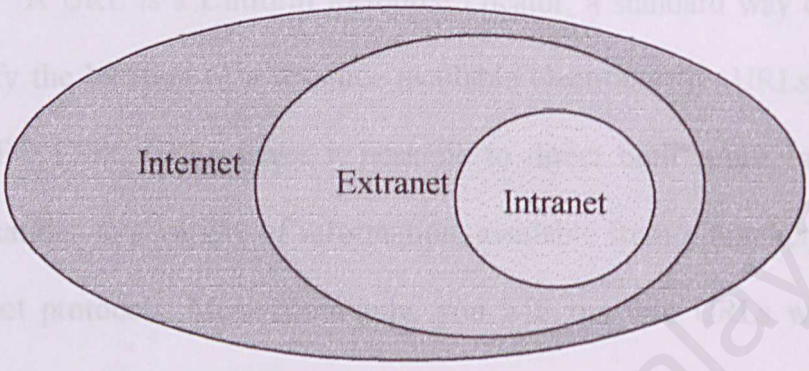


Figure 2.3 Internet, Extranet and Intranet

2.3.6 Conclusion

Seem that virtual business center subsystem is involving a wide range of user in all the places, so the internet is more suitable to this subsystem.

2.4 Internet Review

2.4.1 WWW

The basic idea of WWW is to merge the techniques of computer networking and hypertext into a powerful and easy to use global information system. Hypertext is text with links to further information, on the model of references in a scientific paper or cross-references in a dictionary. With

electronic documents, these cross-references can be followed by a mouse-click, and with the World-Wide Web, they can be anywhere in the world. [5]

2.4.2 URLs

A URL is a Uniform Resource Locator, a standard way developed to specify the location of a resource available electronically. URLs are defined by RFC 1738. URLs make it possible to direct both people and software applications to a variety of information, available from a number of different Internet protocols. Most commonly, you will run into URLs when using a World Wide Web (WWW) client, as that medium uses URLs to link WWW pages together. In WWW browser's "location" box, the item that generally starts with "http:" is a URL. Files available over protocols besides HTTP, such as FTP and Gopher can be referenced by URLs. Even Telnet sessions to remote hosts on the Internet and someone's Internet e-mail address can be referred to by a URL.

A URL is like a complete mailing address: it specifies all the information necessary for someone to address an envelope to each other. However, they are much more than that, since URLs can refer to a variety of very different types of resources. A more fitting analogy would be a system for specifying the mailing address, phone number, or the location of the book that when someone read from the public library, all in the same format. [6]

2.4.3 Web Browser

A web browser is a software interface that allows users browse HTML documents.

2.4.3.1 IE 6.0

Internet Explorer 6.0 is the standard browser in the latest version of Windows (Windows XP). It was released in August 2001 and it support for CSS, DOM and XML. But Internet Explorer 5.0 is the most commonly used browser today. About 60% of the Web community is using it. It has good, but not perfect, support for CSS, DOM and XML [5].

2.4.3.2 Netscape

Netscape 6.2 was released in November 2001. It has been some years since Netscape was the dominating Web browser, and we have all been waiting (too long?) for the version 6 release from Netscape.

With 6, Netscape hopes to eat back some of the 80% or maybe more, Internet Explorer domination. Version 6 provides powerful support for CSS and XML [5].

2.4.3.3 Mozilla

Mozilla is an open-source web browser, designed for standards compliance, performance and portability. Many web site developers is

coordinate the development and testing of the browser by providing discussion forums, software engineering tools, releases and bug tracking [5].

2.4.3.4 Opera

Opera Software AS is an industry leader in the development of Web browsers for the desktop and device markets. The Opera browser (known as "the third browser", after Internet Explorer and Netscape) has been developed over a period of 5 years and has received international acclaim from end-users and the industry press for being faster, smaller and more standards-compliant than other browsers.

On December the 6th 2000, Opera 5.0 entered the market with the intent on winning shares in the browser war. Opera will be distributed on millions of CDs accompanying computer magazines around the world, as well as by other software makers and some of the Internet's major Web sites. It's not a freeware. It charges $ 39 per license.

2.4.3.5 Conclusion

Most of the Internet users now are using the Microsoft Internet Explore, so the most suitable web browser that I'm going to use is IE v6.0.

2.4.4 FTP

FTP is a well-used means for transmitting files over the Internet. While there are many advantages to using HTTP instead, many systems don't offer

full support of HTTP and clients are not as well developed as they are for FTP. Thus, many times files are distributed via FTP [11].

2.4.5 HTTP

HTTP is the Internet protocol specifically designed for use with the World Wide Web, and thus will be the most common scheme you are likely to use.

The host is the Internet address of the WWW server, and the port is the port number to connect to. In most cases, the port can be omitted (along with the preceding colon), and it defaults to the standard "80". The path tells the WWW server which file you want, and if omitted, indicates that you want the "home page" for the system. The search part may be used to pass information to the server, often to an executable CGI script, but for most WWW documents is not used [12].

2.5 *Development Platform*

Operating system (OS) is a platform that performs basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers.

Besides that, the OS makes sure that different programs and users running at the same time do not interfere with each other. For security, OS

ensures that unauthorized users do not access the system. OS provides a software platform to allow application programs run on it. The most popular operating systems currently are Windows 98, Windows 2000, UNIX and Linux.

2.5.1 Window 98

Windows 98 is based on the popular Microsoft Windows 95 Operating System, and is designed for the consumer market. Windows 95/98 was designed for backward compatibility with older DOS and 16bit programs, as well as providing a platform for the newer (back in 1995) 32 bit programs.

Windows 98 works better by making it simple to access the Internet and by providing better system performance along with easier system diagnostics and maintenance. With Windows 98, users' system plays better as well with support for the latest graphics, sound, and multimedia technologies, the ability to easily add and remove peripheral devices with support for Universal Serial Bus (USB), and it also enables users to watch TV on PC. Besides that, Windows 98 is compatible with more software (including games) and hardware.

2.5.2 Window 2000

Windows 2000 is Microsoft's latest version of popular Windows NT Operating System. Windows 2000 Server has big improvement over Windows

NT 4.0. The changes, both fundamental and cosmetic, have made Windows 2000 faster, more reliable, heavier-duty, and easier to use.

2.5.3 UNIX

UNIX is a much older operating system that was created in the late 1960s. UNIX is designed to provide a multi-user, multitasking system for use by programmers. It began as an open source project that became widely used in Universities, scientific labs, and by the U.S. government. The philosophy behind the design of UNIX was to provide simple and powerful utilities that could be pieced together in a flexible manner to perform a wide variety of tasks. Over the years, hundreds of talented programmers contributed their own improvements to UNIX making it extremely robust, stable, and fast.

However, UNIX is more difficult to learn and isn't as widely supported as Microsoft Windows 2000.

2.5.4 LINUX

Linux has gradually become a popular operating system for Internet/ intranet serving purposes. With a host of performance enhancements that will benefit Web sites and Internet sites of all sizes, Linux is a stable and high-performance operating system for Internet usage.

Linux has made progress, primarily in functionality important to Internet infrastructure and Web server capabilities', including a greater selection of drivers, easier installation, and GUI-based front ends for Web administration and window management.

2.6 Web Server

A web server is a piece of software running on a computer that distributes web pages to users on demand, provides an area in which to store and organize the pages of a web site. The machine that runs the web server software could be a remote machine sitting at the other side of a network, or event on the other side of the world, or it could be our own home machine.

A Web server is a program that serves Web pages upon request. Every Web server has an IP address and possibly a domain name. For example, if a user enters the URL http://www.pcwebopedia.com/index.html in your browser, this sends a request to the server whose domain name is pcwebopedia.com. The server then fetches the page named index.html and sends it to the user's browser. Web servers and browsers communicate using HTTP (Hypertext Transfer Protocol), a simple but effective language for requesting and transmitting data over a network.

Web servers come in various shapes and sizes. They run under a variety of operating systems, have varying levels of power and complexity, and range in price from rather expensive to free. Studies on several web

servers will be carried out: Apache, Microsoft Internet Information Server (IIS) and Personal Web Server (PWS).

2.6.1 IIS – Information Internet Server 5.0

IIS is the best Web server available for Windows NT. This version, which comes exclusively as part of the Windows 2000 Server operating system, contains many new features along with performance and reliability enhancements.

IIS v5.0 is good as both a first-time Web server for those familiar and comfortable with Windows operating systems, and a high-end server for hosting providers and large corporate installations. It handles the basics well and is better integrated in Windows than previous versions. IIS v5.0 also comes with performance and feature enhancements that will be attractive for mission-critical tasks.

The ideal computer to run IIS on is at least a 200 MHz Pentium with 128 MB of RAM. Organizations should plan on doubling the RAM and CPU speed if they intend to run Advanced Server's clustering, SQL or Transaction services on the same machine as the Web server.

2.6.2 PWS – Personal Web Server

PWS is entry-level/mid-range server for Windows 9x/NT platforms. It is a scaled-down version of the commercial Information Internet Server (IIS) included with the Server edition of Microsoft Windows NT. PWS is a great entry-level Web server that makes it easy to publish personal home pages, serve small Web sites, and share documents via a local intranet.

PWS is one of the best servers available for helping to get users up and running quickly. Wizards are included to guide users through the process of setting up home pages and sharing files, and the PWS administrator reduces the complexity of actually running the Web server itself. Users can also use the familiar Explorer interface or PWS's Personal Web Manager to share directories, start and stop the server, and view Web site statistics.

One of the best uses for PWS is as a platform for testing out Web sites on Windows 95/Windows NT Workstation computers before hosting them on the Internet. This allows users to check the validity of links, scripts, and applications as well as to ensure that the overall organization of the site is functioning correctly.

PWS presents the ability to develop transactional Web applications using the Microsoft Transaction Server. While most large enterprises will likely bypass Microsoft's Personal Web Server for the high-end Internet Information Server, PWS will remain one of best available options for

individuals wanting to serve their own personal home pages and for small organizations needing to host their own Web sites.

2.6.3 Apache

Apache is a high-end enterprise-level server developed by a loosely knit group of programmers. The original version of Apache was written for UNIX, but there are now versions that run under OS/2, Windows and other platforms. Apache has become the world's most popular Web server. By some estimates, it is used to host more than 50% of all Web sites in the world.

The keys to Apache's attractiveness and popularity lie instead in the qualities listed above and its extensibility, its freely distributed source code, and active user support for the server. And version 1.3.0, now in official release, is already being touted as the most stable and fastest version of Apache ever.

Among the most notable features are its cross-platform support, protocol support (HTTP/1.1), modularity (API), security, logging, and overall performance and robustness. Apache distributes a core set of modules that handle everything from user authentication and cookies to typo correction in URLs.

Table 2.1 Comparison between the four most popular web servers

Web Server	PWS	IIS	Apache	Jigsaw
Version	4.0	5.0	4.0.3	2.0.3
Company	Microsoft Corporation	Microsoft Corporation	Apache Group	W3C
Brief Description	Supports up to 10 concurrent connections, no longer supports FTP	Latest release of most popular web server for Windows NT	The most popular web server currently in use on the internet	Java-based server that provides a blueprint for future web development
Features	A great entry-level web server publishing your own web pages	Updated version of IIS, Index Server, Message Queue Server (MSMQ) and Transaction Server (MTS)	High performance, extremely reliable web server	Administration tools; completely object-oriented design; written entirely in Java
Price	Freeware	Free download (requires IE 4.01 or later)	Freeware	Freely available under open, source license

Table 2.2 Comparison PWS for Windows 98 and Windows NT Workstation

Feature	PWS for Windows NT Workstation	PWS for Windows 98
Typical Uses	Full-featured site development or personal publishing on a corporate intranet	Personal publishing on a low-volume corporate intranet
WWW Service	Yes	Yes
FTP Service	Yes	No
Connection Limit	10	10
Active Server Pages	Yes	Yes
Site Use Logging	NCSA Log File Format (default) MSCSV standard and extended (optional)	NCSA Log File Format
Publishing Sources	Local and network drives	Local drives only
Optional ISM Interface	Yes	No
Authentication	Basic or Windows NT Challenge/Response	None

2.7 *Web Database*

2.7.1 Oracle

Oracle is a multi-user database. It provides unprecedented ease-of-user and is pre-tuned and pre-configured for today's dynamic workgroup and line-of-bus environment.

Oracle includes a fully integrated set of easy-to-use management tools, full distribution, replication and web features. Oracle also provides the highest levels of availability through fast fail over, easier management, and zero data loss disaster protection, with Data Guard, the only complete data protection solution available on the market.

Oracle can runs on UNIX, Linux and Windows platform. However, it is expensive and separate licenses are required for each of its database engine.

2.7.2 MySQL

MySQL is a relational database management system. MySQL stores data in separate tables rather than putting all the data in one big storeroom. This adds speed and flexibility. The tables are linked by defined relations making it possible to combine data from several tables on request.

MySQL is a small, compact, easy to use database server, ideal for small and medium sized applications. It is client/server implementation that consists of a server and many different client programs. It is available on a variety of UNIX platforms, Linux, Windows NT, Windows 95/98 and Windows 2000.

MySQL is Open Source Software. Open Source means that it is possible for anyone to use and modify. Anybody can download MySQL from the Internet and use it without paying anything. Anybody can study the source code and change it to fit their needs.

2.7.3 Microsoft SQL Server 7.0

Microsoft SQL Server 7.0 is a single process, multithreaded relational database server primarily intent for transactional processing. It is based on the

client/server architecture, which divides processing into two components: a front-end, or client component, that run on a local workstation and a back-end, or server component that runs on a remote computer.

2.8 *Data Access Technology*

Virtual Business Center will require data access technology to enable communication and access to its various databases. A few of the Microsoft Data access strategy and technology is reviewed and considered.

2.8.1 Universal Data Access (UDA)

UDA is a high-level specification developed by Microsoft for accessing data objects regardless of their structure. The strategy of Universal Data Access is to assure open, integrated, standards-based access to all types of data that is from SQL to non-SQL to even unstructured data across a wide variety of applications, from traditional client/server to the web. The main components of UDA are ADO, OLE DB and ODBC.

2.8.2 ADO (Active Data Object)

Active Data Object (ADO) is the Microsoft's newest high-level interface for data objects that most applications developers will use.

ADO is designed to eventually replace Data Access Objects (DAO) and Remote Data Objects (RDO). Unlike RDO and DAO, which are designed

only for accessing relational databases, ADO is more general and can be used to access all sorts of different types of data, including web pages, spreadsheets, and other types of documents.

ADO provides consistent access to data for creating a front-end database client or middle-tier business object using an application, tool, language, or even an Internet browser. ADO is the single data interface for developers creating 1 to n-tier client/server and Web-based data-driven applications.

2.8.3 OLE DB

OLE DB Providers are the data access engines or services, as well as the business logic components that these applications can use in a highly interoperable, component-based environment.

OLE DB is a set of interfaces that are designed to provide data access to all data, regardless of type, format or location. It effectively "componentizes" database and related data processing functionality, breaking it up into interoperable components that can run as middleware on the client or server across a wide variety of applications. The OLE DB architecture provides for components such as direct data access interfaces, query engines, cursor engines, optimizers, business rules and transaction managers.

The concept of OLE DB is to explode the database into its basic parts. OLE DB delivers components, external to the database, that provide this typical database functionality in reusable component architecture. And these components, because they are not directly linked to the database itself, can be shared across multiple applications, systems and data stores to provide a higher level, universal interface.

2.8.4 ODBC (Open Database Connectivity)

ODBC is a standard database access method developed by Microsoft Corporation. The goal of ODBC is to make it possible to access any data from any application, regardless of which database management system (DBMS) is handling the data. ODBC manages this by inserting a middle layer, called a database driver, between an application and the DBMS. The purpose of this layer is to translate the application's data queries into commands that the DBMS understands. For this to work, both the application and the DBMS must be ODBC-compliant -- that is, the application must be capable of issuing ODBC commands and the DBMS must be capable of responding to them. Since version 2.0, the standard supports SAG SQL.

2.8.5 JDBC

JDBC technology is an API that lets you access virtually any tabular data source from the Java programming language. It provides cross-DBMS connectivity to a wide range of SQL databases, and now, with the new JDBC

API, it also provides access to other tabular data sources, such as spreadsheets or flat files.

The JDBC API allows developers to take advantage of the Java platform's "Write Once, Run Anywhere" capabilities for industrial strength, cross-platform applications that require access to enterprise data. With a JDBC technology-enabled driver, a developer can easily connect all corporate data even in a heterogeneous environment

2.9 *Web Application Programming Languages*

2.9.1 Client-Side Scripting Languages

2.9.1.1 Java

Java is a cross-platform language for developing application. When Java first hit the web in mid 1990s, it created a tremendous stir. The idea is to use Java code in form of applets, which Java components that can be easily inserted into web pages with the aid to the <APPLET> tag.

Java enjoys better functionality than scripting language, offering better capabilities in areas such as graphic functions and file-handling. Java is able to provide these powerful features without compromising security because Java applet run in what is know is sandbox – which prevent malicious programs downloaded from the web from doing damage to your system. Java also boasts strong database support through JDBC (Java Database Connectivity).

Microsoft and Netscape browsers both have built-in Java support, and there are several standard <OBJECT> and non-standard <APPLET> tags which are used to add Java applets to a web page. These tags tell the browser to download a Java file from a server and execute it with Java Virtual Machine built into the browser. Of course, this extra step in the web page building phase means that Java applets can take a litter while to download, and they can take even longer to process once on the browser. So while on the Web, larger ones are still not as widespread as scripted pages.

Although the popularity of Java today isn't quite what some people expected, it makes an ideal teaching tool for people wishing to break out into more complex languages; and its versatility makes it well-suited for programming web application.

2.9.1.2 Dynamic HTML

Dynamic HTML (or DHTML) is really nothing more than a buzzword – it was introduced by both Microsoft and Netscape with their version 4 browsers, to advertise additional scripting features such as the ability to animate pages and graphics without a page refresh , and to position text precisely by using (x, y)-type coordinates. At the time, scripting was seeing a lower uptake than either company would have liked, so this move was intended to create a greater appeal to the masses, by dubbing it 'DHTML' and cashing in on HTML's familiarity and simplicity.

At the end of the day, the main innovation introduced in Dynamic HTMK was the ability to manipulate any feature on a web page directly using client-side scripting. This was made available via the Document Object Model =, but even together with the extra integration with style sheets, you're still creating your web page from client-side script and HTML. The main downside of DHTML was the fact that Microsoft and Netscape chose to implement these features in methods that were incompatible with one another advent of the version 5 browsers sees much tighter links with the standards, and hopefully a more cross-browser technology.

2.9.1.3 ActiveX Controls

ActiveX Controls is a self-contained program (or component), written in a language such as C, C++ or Visual Basic. When added to a web page, an ActiveX control provides a specific piece of client-side functionality, such as a bar chart and graph, timer, client authentication, or database access. ActiveX control is added to HTML pages via the <object> tag, which is now part pf the JTML standard. ActiveX controls can be executed by the browser when they are embedded in a web page.

There is a catch. ActiveX controls were developed by Microsoft, and despite being compatible with the HTML standard, they are not supported on any Netscape browser prior to version 5 (which, at time of writing, was still in beta) without an ActiveX plug-in. Without this, they will only function on Internet Explorer, although there is plug-ins available if you want ActiveX

functionality with Netscape browser. Consequently, they still can't really be considered a cross-platform way of making your pages dynamic.

2.9.1.4 JavaScript

Java script is a scripting language developed by Netscape to enable web authors to design interactive sites. Java script is different from Java. Although it shares many of the features and structures of the full Java language, it was developed independently. Java script can interact with HTML source code to enable web authors to spice up their sites with dynamic content. JavaScript is endorsed by a number of software companies and is an open language that anyone can use without purchasing a license. It is supported by recent browsers from Netscape and Microsoft, though Internet Explorer supports only a subset, which Microsoft calls Jscript.

2.9.2 Server-Side Scripting Languages

2.9.2.1 ASP

ASP is a server-side scripting technology. ASP is indeed HTML page with an .asp extension. ASP allows for HTML and a scripting language such as VBScript, JScript or Perl to be interspersed in a Web page. When a browser requests an ASP page, the Web server generates a page with HTML code and sends it back to the browser.

One of the most important features about ASP is that it allows user to easily access data and put it on a Web page. User can simply display data from an ODBC-compliant database, or use ASP to make decisions about what to display on a Web page. User can then format the results in any way that they please.

Another important ASP feature is the ability to use cookies to store and retrieve information. The Request object has a Cookie collection, and user can use this in data processing.

2.9.2.2 CGI

The Common Gateway Interface (CGI) is a mechanism for creating scripts on the server, which can then be used to create dynamic web application. It has been around for quite a bit longer than ASP, and right now the majority of dynamically-created pages on the web created using CGI and a scripting language. However, it's incorrect to assume that CGI does the same job as ASP. Rather, CGI allows the user to invoke another program (such as PERL script) on the web server to create the dynamic web page, and the role the CGI is to pass the user-supplied data to the this program for processing. However, it does provide the same end-result – a dynamic web application.

However, CGI has some severe shortcomings. The major one is that it adds an extra level to our browser-server model of interaction: namely, it's necessary to run a CGI program to create the dynamic page, before the page is

processed on the server. Also, the format in which CGI receives and transmits data means that this data is not easily manipulated by many programming languages, so you have to use a programming language that has good facilities for manipulating text and communication with other software. The most able programming languages that can work on any operating system for doing this are C, C++, and PERL. While they can adequately do the job for you, they are some of the more complex languages to learn. Visual Basic doesn't offer sufficiently adequate text-handling facilities, and is therefore really used with CGI.

2.9.2.3 Java Server Pages (JSP)

JavaServer Pages is a web-scripting technology that allows you to combine markup (HTML or XML) with Java code to dynamically generate web-pages. The JSP specification is implemented by several web servers, and plug-ins are available that allow you to use JSP with IIS 4.0. One of the main advantages is the portability of the code between different servers. JavaServer Pages isn't directly related ASP, but it dose boast can be embedded into web pages.

By default, JSP uses Java as its scripting language; however, the specification allows other languages to be used, just as ASP can use other languages (such as JavaScript and VBScript). While JSP with Java will be more flexible and robust than scripting platforms based on simpler languages like JavaScript and VBScript.

JSP provides a number of server-side tags that allow developers to perform most dynamic content operations. So developers who are only familiar with scripting, or even those who are simply HTML designers, can use JSP tags for generating simple output. Advanced scripters or Java developers can also use the tags, or they can use the full Java language if they want to perform advanced operations in JSP pages.

2.9.2.4 Coldfusion

ColdFusion is a product created by Allaire Corporation of Cambridge, Mass. that includes a server and a development toolset designed to integrate databases and Web pages. Cold Fusion web pages include tags written in ColdFusion Markup Language (CFML) that simplify integration with databases.

ColdFusion enable to access data as server builds an HTML page. Like ASP, ColdFusion pages are readable by any browser. ColdFusion also utilized a proprietary set of tags, which are processes by the ColdFusion Server software. This server software can run on multiple platforms, including Microsoft IIS, Netscape Enterprise Server and UNIX / Apache. The major difference is that while ASP solutions are built primarily with VBScript and objects, ColdFusion utilizes the tags which encapsulate functionality. ColdFusion lacks some of the internal ASP objects; however it sports its own set of solution to common problems, including access to ADO functionality.

Coding for ColdFusion pages is much more straightforward and intelligible than JavaScript, VBScript, C++ or Java, even while providing high levels of functionality. The tags themselves conform to the basic HTML syntax of tag name followed by tag attributes, and are enclosed in the familiar HTML brackets (<>). Most tags are two-sided, and can be combined with each other and with HTML elements to create custom tags for use in ColdFusion applications.

2.9.2.5 PHP

PHP Hypertext Preprocessor is an open-source server-side; HTML embedded scripting language used to create dynamic Web pages for e-commerce and other Web applications. In an HTML document, PHP script (similar syntax to that of Perl or C) is enclosed within special PHP tags. Because PHP is embedded within tags, the author can jump between HTML and PHP (similar to ASP and Cold Fusion) instead of having to rely on heavy amounts of code to output HTML. And, because PHP is executed on the server, the client cannot view the PHP code.

PHP offers excellent connectivity to most of the common databases (including Oracle, Sybase, MySQL, ODBC and many others). PHP also offers integration with various external libraries, which allow the developer to do anything from generating PDF documents to parsing XML.

PHP is the natural choice for developers on Linux machines running Apache server software, but runs equally well on any other UNIX or Windows platform, with Netscape or Microsoft Web server software. PHP also supports HTTP sessions, Java connectivity, regular expressions, LDAP, SNMP, IMAP, COM (under windows) protocols. It also supports WDDX complex data exchange between virtually all Web programming languages.

2.9.2.6 ASP.NET

ASP 3.0 is the latest version of ASP. ASP.NET is the next generation ASP, but it's not an upgraded version of ASP. ASP.NET is an entirely new paradigm for server-side ASP scripting. ASP.NET is a part of the new .NET (dotnet) Framework. Microsoft spent three years rewriting ASP.NET from the ground up, and ASP.NET is not fully backward compatible with ASP 3.0.

2.9.3 Differences between ASP and ASP.NET

- ASP.NET has better language support, a large set of new controls and XML based components, and better user authentication.
- ASP.NET provides increased performance by running compiled code.
- ASP.NET code is not fully backward compatible with ASP.

2.10 Web Application Development Tools

2.10.1 Macromedia Dreamweaver 3.0

Macromedia Dreamweaver is professional visual editor for creating and managing web sites and pages. It gives developers the productivity of a visual web page layout tool, the control of an HTML text, editor and support for new web technologies, all in a software packing.

Developers can use it to create web sites visually, with confidences that HTML being generated is concise and always editable. It includes advanced features that take advantage of the latest innovations on the web, such as dynamic HTML and CSS, while still ensuring that web pages work well in a variety of web browsers. All of the code generated by it is carefully created to work on as many platforms and browsers as possible.

Others features include easy integration of Active X components, Java applets, Plug-ins for improved web page interactivity. It also integrates seamlessly with other components of Macromedia, such as Flash Movies, Shockwave, and Fireworks, which are essential for the development of interactive web pages.

2.10.2 NotePad

Notepad is the world's most versatile HTML editing tool absolutely free when purchase this software: Windows version 2.0 and above.

Notepad has one of the simplest user interfaces of any Internet Web authoring tools. The menus are logically laid out, conforming to all standards in design, so users can understand them before use Notepad.

Notepad has the same interface for all versions of Windows, so moving over to the latest version of Windows should not hamper HTML code creation. The Notepad web-authoring tool is compatible with every single standard of Internet presentation medium yet devised. Notepad was designed to have a very small application footprint, taking up as little space as possible in computer's memory, and a minimum of disk space.

Notepad gives clear, easy to read and full HTML. There is no code hidden, and users have control over all parts of the HTML code. JavaScript is also fully supported by Notepad. All parts of the JavaScript are fully available through Notepad, without the need of complex tools.

2.10.3 Microsoft FrontPage 2000

First released in 1995, FrontPage 2000 is the fifth version of Microsoft's Website creation software. For the first time, the program is included as of Microsoft Office (in addition to being sold as a standalone product), and its Office integration features take advantage of the popularity of that suite by sharing much of the same interface and many of the same tools. Other features new to this version allow greater collaboration and use of newer web technologies.

2.10.3.1 Strengths:

Themes Provide Consistent Look and Feel – it includes 67 professionally create themes (up from 50 in the previous version), each of which includes features such as buttons, color combinations, and backgrounds. A single theme can be applied to all of pages in a website to provide a consistent appearance for the site or give pages different themes.

It lets us paint a page through a very easy and intuitive interface. A number of helpful toolbars make the editor's window look like a powerful graphical creation product.

The FrontPage 2000 editor supports a wealth of modern technologies, such as HTML 4.0, Cascading Style Sheets 1, insertion of Java language applets, Jscript and VBScript, ActiveX controls, themes, and even Dynamic HTML effects. FrontPage also supports bots; a special set of tags within page code specifically interpreted by the server's FrontPage extensions and the editor it.

2.10.3.2 Limitation:

Uses Proprietary Technology – it does not support third-party database access products.

2.10.4 Microsoft Visual InterDev 6.0

Microsoft Visual InterDev is a Web development tool designed for programmers to create an interactive Web page with data is as simple as dragging and dropping, setting some properties, and saving the page. No coding is required in using Visual InterDev.

Visual InterDev includes site design tools that help user easily plan pages, organize their links, and apply a consistent theme to your Web site. Visual InterDev includes three ways to view your HTML and ASP pages.

These three views are the cornerstone of Visual InterDev. They replace the simple source code editor included with Visual InterDev 1.0 and supports design-time controls (DTCs), debugging, statement completion, and object browsing.

The new data environment provides easy commands for making Web application data-driven. Instead of burying complex SQL statements deep within an .asp file, the statements are now exposed, maintained, and reused at the application level through the data environment under the Global asp file. Instead of modifying the query within each page, developers can modify the data command and changes are incorporated into files that reference that data command. Developers also can drag fields from the command directly onto HTML or ASP page.

However, for those so inclined, Visual InterDev exposes a full object model that allows developers to fine-tune their application, perform client validation, and have full control of Web application. Visual InterDev supports not only full-reach applications, using the ASP engine to produce simple HTML pages for the client, but also DHTML and Microsoft Internet Explorer 4.0 data binding for a richer client experience.

2.10.5 Edit Plus

EditPlus is an Internet-ready 32-bit text editor, HTML editor and programmer's editor for Windows. While it can serve as a good replacement for Notepad, it also offers many powerful features for Web page authors and programmers.

EditPlus supports powerful and customizable syntax highlighting for HTML, CSS, PHP, ASP, Perl, C/C++, Java, JavaScript and VBScript by default. Also, users can create their own syntax file to support other programming languages, such as ASP, Java and PHP.

EditPlus includes features:

1. Internet features

Seamless web browser for previewing the content of HTML document or Java applet without leaving the editor. Browser window also has common browser commands so users can browse Internet web sites as well as local HTML files. FTP commands for uploading local files to FTP server or for

editing remote files directly. Highlights URL and e-mail addresses in normal text files and lets you activate them with a single keystroke (F8) or 'Ctrl + double-click'.

2. HTML toolbar

The HTML Toolbar allows users to insert common HTML tags quickly and easily. It also supports useful tools such as HTML Color Picker, Character Picker, Table Generator and Object Picker.

3. Document selector

The Document Selector offers quick mouse access to all document windows currently loaded. Much faster than selecting on Window menu or pressing Ctrl+Tab key multiple times.

4. User tools

EditPlus supports user-defined tools, help files and keystroke recording files. The output of tool execution can be captured in the Output Window, so that users can double-click the error line to automatically load the file and locate the cursor to that line.

5. Auto-completion

Auto-completion is a timesaving feature, which changes a short abbreviation into a complete string. It supports Perl and C/C++ by default.

Also, users can create their own auto-completion file to support other programming languages.

6. Cliptext window

The cliptext window is collection of text clips for quick and easy access. Users can easily customize them, and can also create on cliptext file.

7. Document template

Document template offers a quick start when create a new document.

2.11 Security

One of the most argued issues in developing web-based application will be the security. In the world of the internet, nothing is 100% secured. Therefore, what can we do so, some techniques and protocol was introduced.

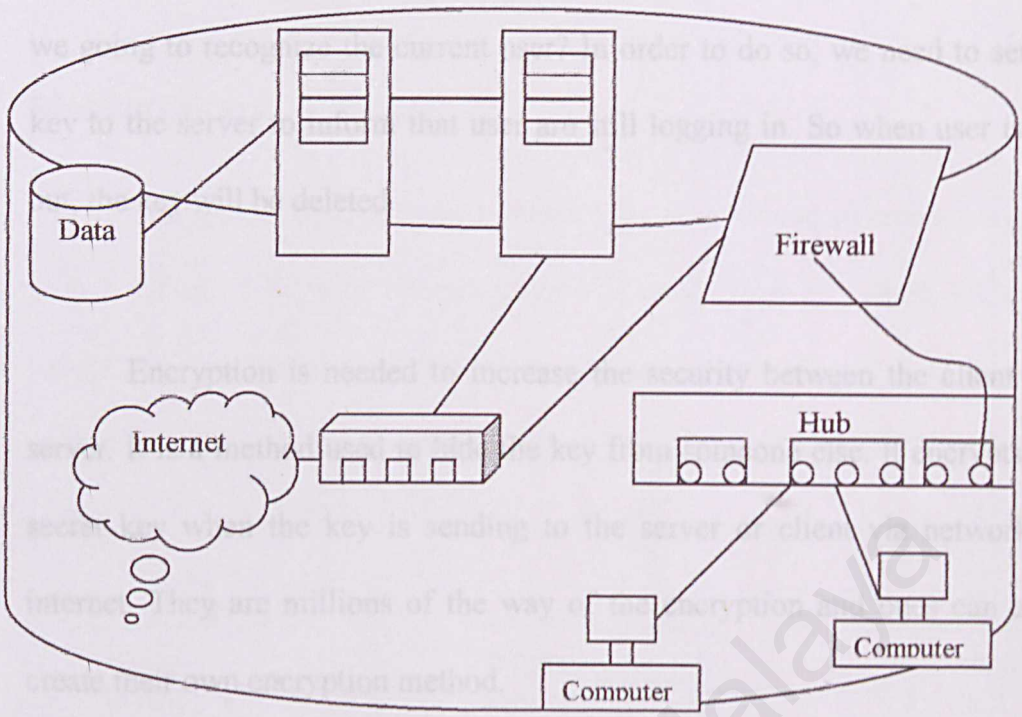
2.11.1 Firewall

A firewall is a network in a node setup as a barrier to prevent traffic crossing from one segment to another. As seen in the diagram below, firewalls are need to improve network traffic as well as for security propose, and may serve as a barrier between connected public (left of the firewall) and private (right of the firewall) network. A firewall may be implemented in a router or it may be a network devices specialized for this purpose. It has the following attributes.

i) Provide protection at the boundary of a domain

ii) Check data entering or leaving a domain

Figure 2.4 Simple layout of a firewall



2.11.2 SSL (Secure Socket Layer)

SSL was first developed by Netscape Communication Corporation. It is used for authenticated and encrypted communication between clients and servers on the World Wide Web (www). It works by using a private key to encrypt data sent through the SSL connection (web pages that required on SSL protocol starts with "http")

The SSL protocol is designed to provide privacy between two communication application (a client and a server). Second, the protocol is designed to authenticate the server, and optionally the client.

2.11.3 Authentication and Encryption

Authentication is the process to allow users to confirm his or her identity to web application. This is the process that the login part is doing.

While the user is log on to the application (server), the problem is to how are we going to recognize the current user? In order to do so, we need to send a key to the server to inform that user are still logging in. So when user is log out, the key will be deleted.

Encryption is needed to increase the security between the client and server. It is a method used to hide the key from someone else. It encrypts the secret key when the key is sending to the server or client via network or internet. They are millions of the way of the encryption and ones can even create their own encryption method.

3 Chapter 3 - System Requirements Analysis

3.1 Methodology

The system development methodology is a method to create a system with a series of steps or operations or can be defined as system life cycle model. Every system development process model (see Figure 3-1) includes system requirements (user, needs, resource) as input and a finished product as output.

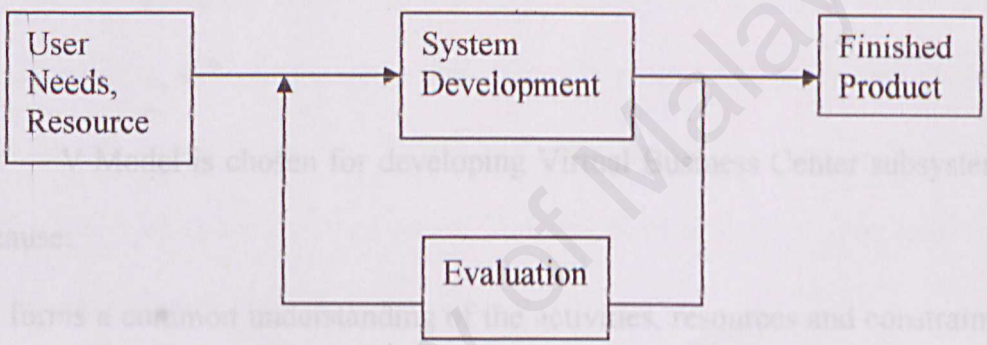


Figure 3.1 System Development Process Model

The main point for using the process model to develop a system because building a process model and discussing its sub processes help the team understand this gap between what should be and what is. Every process should be tailored to every situation that with a possibility the event will occur. So building a process model can help the member of the development team understands their commonalities are to occur.

There are several process models in system development:

1. Waterfall Model
2. Waterfall Model with prototyping
3. V Model
4. Prototyping Model
5. Operational Specification Model
6. Transformational Model
7. Phased Development Model
8. Spiral Model

V Model is chosen for developing Virtual Business Center subsystem because:

- It forms a common understanding of the activities, resources and constraints involved in the software model
- Easier to detect inconsistencies, redundancies, and omissions in the process and in constituent parts
- Reflect the goals of development, such as building high-quality software, finding faults early in development, and meeting required budget and schedule constraints.
- Ideal development models that stressing testing
- The problem of unclear requirements could be exacerbated by the possibility of "freezing" requirements
- The likelihood of maintenances; to ensure that the project is well structured and documented if enhancing and adapting it in future

3.1.1 V Model

The V Model is a variation of the waterfall model that demonstrates how testing activities are related to analysis and design (German Ministry of Defense 1992). The model is like a V shape and the analysis and design are on the left, testing and maintenance are on the right. The V model showing that how the testing phase is closely related to the system analysis stages. The unit and integration testing will be used to verify the program design, the system testing will be used to verify the system design and the acceptance testing will be used to validate the system requirements. Acceptance testing is involved or conducted directly from the users rather than development team it self. So any requirement that is found not fulfills the users' needs than the process will start again from the early stage again. The processes will continuing until the all the requirements meet the users needs.

The model consists of eight stages that are depicted as cascading from one to another (see Figure 3-1). Each development stage should be completed before the next begins. The eight stages are:

1. Requirements Analysis

Understanding and determining users need by having brainstorming, eliciting and analyzing user requirements by having interview, survey or questionnaire session, collecting and specifying all the user requirements and validating requirements.

2. System Design

Research to the existing system to define the system functional requirements, determining and specifying software and hardware architecture that will used during the developing.

3. Program Design

Defined and specifying the program and database design that will be used to develop the system.

4. Coding

Programming practices. This will involve a real practice to implement the functional and non functional requirements and the system design. Usually need a long cycle time to the whole development process.

5. Unit and Integration Testing

Many type of testing will be implemented during the unit and integration testing to minimize the possibility of the fault occurs. Each unit will be test up before the integration process to be take action. This will be used to verify the program design that defined in the early stage.

6. System Testing

After all units have successfully tested, the combination of each module will need the whole system testing before it can be delivery. System testing will used to verify the system design.

7. Acceptance Testing

Users will involve in the acceptance testing to check the implemented defined requirements. After the acceptance testing, the system wills delivery.

8. Operation and Maintenance

System will be monitor and to make sure all functions have successfully implemented. System will be maintenance periodicity.

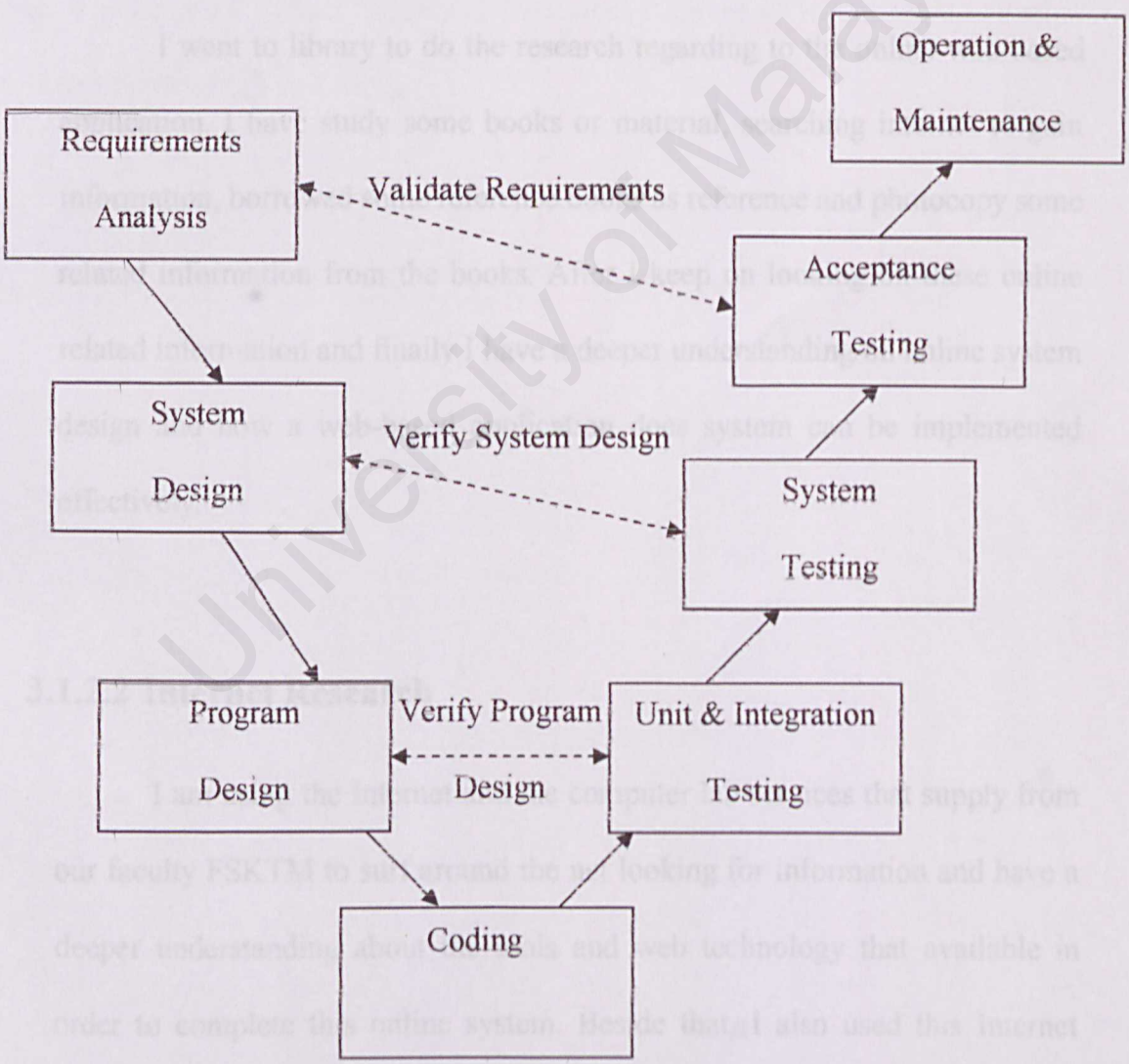


Figure 3.2 V Model

3.1.2 Techniques Used To Define Requirements

There are many kind of the ways can be used to define the system requirements. But appropriate and effective techniques must be used to elicit the users' requirements. So these are the research methods that I'm using to get important information from many of the viewpoints, they are library research, internet research and survey.

3.1.2.1 Library Research

I went to library to do the research regarding to the online web-based application. I have study some books or material, searching internet to gain information, borrowed some reference books as reference and photocopy some related information from the books. After I keep on looking on these online related information and finally I have a deeper understanding on online system design and how a web-based application does system can be implemented effectively.

3.1.2.2 Internet Research

I am using the Internet and the computer lab services that supply from our faculty FSKTM to surf around the net looking for information and have a deeper understanding about the tools and web technology that available in order to complete this online system. Beside that, I also used this Internet service to look for the existing system that similar to the Virtual Business

Center subsystem and study how the online system work through the Internet and get more understanding to the existing system workflow.

3.1.3 Conclusion of System Requirements

From the research above, I found that most of the student is really hampered by the financial burden. Some of the student is using the illegal text books, mean that they use a photocopy books. When reach end of the semester, many students who indent to sell out the used books are hardly find the way out. So is the time to create a place like a Virtual Business Center Subsystem to solve the communication problems between the students.

4 Chapter 4 – System Requirement Analysis

4.1 Functional Requirements

Functional requirement describes an interaction between the system and its environment. [1] It is a statement of the service or functions that a system should provide how the system reacts to particular inputs, and how the system should behave in particular situations. [Sommerville, 1998]

The functional requirement for Virtual Business Center Subsystem consists of three main modules: User Management Module, Auction Module and Trading Module.

4.1.1 User Management Module

- Provides online registration for new users
- Allows users login, Validation users authentication
- Allows users to view, update, and add-in their personal profile
- Allows users to view their own messages or emails
- Allows users to view their own account profile
- Allows users to top up their prepaid token account

4.1.2 Auction Module

- Provides an electronic market place for auction
- Allows sellers to upload, edit and delete products information
- Products auction period setup

- Bidder must bid higher than the current bid or the minimum bid for any product
- The token will be automatically deducted from the buyer's account after completing the auction / transaction
- System able to detect the highest biding and automated inter-exchange of successful bidder's and owner's contacts

4.1.3 Trading Module

- Provides online catalogue for User/Guest viewing
- Provides online Shopping Cart
- Provides online newest bulletin to acknowledge user
- Provides searching feature
- Provides online request form
- Allows online purchasing
- Allows simple payment through prepaid token system
- Provides Help function

4.2 Non-Functional Requirements Analysis

Non-functional specifications are the constraints under which a system must operate and the standards which must be met by the delivered system [Sommerwille, 1995]. The E-Market Online System must ensures certain web application qualities like user-friendliness, correctness, functionality, reliability, flexibility, efficiency as well as maintainability.

4.2.1 Scalability and Integration

It is a very import feature of the system to expand and integrate with other existing system. This system must be develops to be able to extend in the future when the users is increasing to a huge number. This system need to have a flexibility to integrate with existing system. For example integrate with the existing university system in local universities.

4.2.2 User-Friendliness

User interfaces design creates an effective communication medium between a human and a computer. Therefore, it is very important to make sure that the interfaces fulfill user-friendliness so that it would not cause trouble to users. The Golden Rules [Mandel, 1997] coins three rules:

4.2.2.1 Place the user in control

This will define interaction modes in a way that does not force a user into unnecessary or undesired actions. Besides, it also provides flexible interaction for different users for instance via mouse movement and keyboard commands.

4.2.2.2 Reduce the user's memory load

One of the principles that enable an interface to reduce the user's memory load is by reducing demand on short-term memory. The interface

should be designed to reduce the requirements to remember past actions and results.

4.2.2.3 Make the interface consistent

The interface design should apply to consistent fashion where all visual information must be organized according to a design standard that is maintained throughout all screen displays. Apart from that, input mechanisms are constrained to a limited set that are used consistently throughout the application. Lastly, mechanisms for navigating from task to task are consistently defined and implemented.

4.2.3 Correctness

A program or system must operate correctly or it provides little value to its users. Correctness is the degree to which the software performs its required function. To ensure this application quality, lots of testing and trial-and-errors will be carried out.

4.2.4 Functionality

The functionalities stressed here are the searching and retrieving capability, which is very important in any web application that deals with data retrieval from existing database. Besides, navigation and browsing features as well as application domain-related features will be taken into account.

4.2.5 Reliability

Reliability is the extent to which a program can be expected to perform its intended function with required precision [Pressman, 2001]. It is closely related to correct link processing, error recovery and user input validation and recovery.

4.2.6 Flexibility

Flexibility of the system is stress on the Java-based system, which is able to receive user request from multi-platform. In other words, whether a user makes request from Windows-platform computer or Linux-platform computer, the user is able to retrieve the appropriate output. This is indeed the strength of the technology used in developing the subsystem.

4.2.7 Efficiency

Undeniable, efficiency is the main key for implementing the new meetings management system. Efficiency is understood as the ability of a process procedure to be called or accessed unlimitedly to produce similar performance outcomes at an acceptable or credible speed [Sommerwille, 1995]. Efficiency is measured base on response time performance, page generation speed and graphics generation speed.

4.2.8 Maintainability

System maintenance accounts would require more effort if the system is not designed according to good programming practices. Maintainability is the ease with which a program can be corrected if an error is encountered, adapted if its environment changes, or enhanced if the customer desires a change in requirements [Pressman, 2001].

4.2.9 Accessibility and Simplicity

System must be easy to learn and suitable to any range of users. Some experience user requires a direct interaction with users, but some of users may lack of knowledge about the information technology. If the system is simple access and provide a guideline when user facing problems, then the user will fell friendly and more closely to the system.

4.2.10 Response Time

A system response time is very important to ensure that user will not fell bore to the system. A faster response time is better than a slower. Consider as a quality of program design and implementation of the system design.

4.2.11 Security and Integrity

The proposed system has also security measures to minimize the risk of data disclose to unauthorized users. System can prevent the unauthorized data modification from unauthorized users.

4.3 Software Specification

4.3.1 Development Platform

Windows is chosen as the development platform. Microsoft's Windows 2000 is built to work with a series of microprocessors from the Intel Corporation that share the same or similar sets of instructions.

The main reason for choosing Microsoft's Windows 2000 as the development operating system is because most of the computers in FSKTM are currently installed with Windows 2000. Therefore, the implementation of the new system can be done easily and effectively.

4.3.2 Database

MySQL has become a very popular choice for Web applications, particularly those serving Web content. Developers have been choosing MySQL because it has some very nice attributes. [7]

4.3.2.1 Advantages of MySQL [7]

1. MySQL is extremely fast when running SQL SELECT statements. MySQL was built for speed. The core of the MySQL engine is very small and stream-lined, and the default table type (a modified ISAM table) was designed specifically for running SELECTs quickly. If your application calls for the advantages of a relational data structure but the database contents are

relatively static -- as is often the case with Web content or product catalogs -- MySQL's speed is a great advantage.

2. MySQL is also undeniably stable. In both your production and serving environments, you can be reasonably confident that MySQL will be up and processing queries as long as power flows to your machine.
3. Its relatively shallow learning curve. Web applications don't require many of the advanced and arcane features that are found in the large, expensive proprietary RDBMSs. Even if you're new to relational databases, you can learn MySQL and create very sophisticated Web applications in a short period of time.
4. Cost-effective, easy to use and reliable. One doesn't need weeks of expensive training and a shelf full of manuals to make it work well. The MySQL support is truly outstanding. [10]

4.3.3 Data Access Technology

JDBC is chosen as the data access technology because of the features below:

1. JNDI support – Ease of deployment (gives JDBC driver independence, makes JDBC applications easier to manage)

2. Connection pooling – Performance improvement (a connection pool is a cache of database connections that is maintained in memory, so that the connections may be reused). Important for implementing a distributed transaction processing system

3. JavaBeans™ (RowSet objects) – Send data across a network to thin clients, such as web browsers, laptops, PDAs, and so on. Access any tabular data source, even spreadsheets or flat files. Make results sets scrollable or updateable when the JDBC driver does not support scrollability and updateability. Encapsulate a driver as a JavaBeans component for use in a GUI

4.3.4 Web Server

JSP is web server-independent, which means it can be developed in IIS, Apache Web Server or any other web server. In this proposed system, Apache Tomcat 4.1 has been chosen as the development web server as it has been fully developed as Java-based Web Server under Jakarta project carried out by Apache. With simple configuration, it is able to run the application smoothly as expected. Tomcat 4.1.8 Beta is the latest release. Tomcat 4.1 is a refactoring of Tomcat 4.0.x, and contains significant enhancements, including: [8]

- JMX based administration features
- JSP and Struts based administration web application
- New Coyote connector (HTTP/1.1, AJP 1.3 and JNI support)
- Rewritten Jasper JSP page compiler
- Performance and memory efficiency improvements
- Enhanced manager application support for integration with development tools

- Custom Ant tasks to interact with the manager application directly from build.xml scripts

4.3.5 Scripting Language Technology

JSP has been selected as the web development tool for the proposed system. The reasons of choosing JSP are as follows:

Benefits of Servlets Over Traditional CGI. [9]

1. Powerful

Servlets support several capabilities that are difficult or impossible to accomplish with regular CGI. Servlets can talk directly to the Web Server, whereas regular CGI programs cannot, at least not without using a server-specific API. Multiple servlets can also share data, making it easy to implement database connection pooling and similar resource-sharing optimizations. Servlets can also maintain information from request to request, simplifying techniques like session tracking and caching of previous computations.

2. Convenient

Servlets have an extensive infrastructure for automatically parsing and decoding HTML form data, reading and setting HTTP headers, handling cookies, tracking sessions and many other high level utilities. Servlets is

especially convenient for those who already know Java Programming Language.

3. Efficient

With traditional CGI, a new process is started for each HTTP request. If the CGI program itself is relatively short, the overhead of starting the process can dominate the execution time. With servlets, the Java Virtual Machine stays running and handles each request using a lightweight Java thread, not a heavyweight operating system process.

4. Inexpensive

There are several free or inexpensive Web Server available that are good for "personal" use or low-volume Web sites. Exclusive Apache, most commercial-quality Web Servers are relatively expensive. Besides, for any Web Server, no matter its cost, adding a servlet support to it (If it doesn't come preconfigured to support servlets) costs very little extra.

5. Secure

CGI programs often executed by general-purpose operating system shells. This becomes the main weakness of CGI programs as whenever programmers forgot to consider certain array check, the system will be opened up to deliberate or buffer overflow attacks. In this case, servlets suffer from neither of these problems as if a servlet executes a remote system call to invoke a program on the local operating system, it does not use a shell to do so.

6. Portable

Servlets are written in Java programming language and follow a standard API. In fact, servlets are supported directly or by plug-in on virtually every major Web Server. They are now part of the Java 2 Platform, Enterprise Edition (J2EE), so industry support for servlets is becoming even more pervasive.

Benefits of JSP:

- Versus Active Server Pages (ASP)

Even though ASP is a competing technology from Microsoft, the advantages of JSP are twofold. First, the dynamic part is written in Java, not VBScript or another ASP-specific language, so it is more powerful and better suited to complex applications that require reusable components. Second, JSP is portable to other operating systems and Web servers. [9]

- Versus pure Servlets

JSP documents are automatically translated into servlets behind the scenes. Nevertheless, relatively, it is more convenient to write regular HTML than to have a zillion println statements that generate the HTML. To some Web page design experts they can build the HTML using familiar tools and leave places for the servlet programmers to insert the dynamic content. [9]

- Versus Server-side Includes (SSI)

SSI is widely supported technology for inserting externally defined pieces into a static Web page. JSP is better because you have a richer set of tools or building that external piece and have more options regarding the stage of the HTTP response at which the piece actually gets inserted. [9]

- Versus JavaScript

JavaScript, which is completely distinct from the Java programming language, is normally used to generate HTML dynamically on the client, building parts of the Web page as the browser loads the document. This is a useful capability but only handles situations where the dynamic information is based on the client's environment. With the exception of cookies, the HTTP request data is not available to client-side JavaScript routines. Relatively, Java is far more powerful, flexible, reliable and portable. [9]

- Versus Static HTML

Regular HTML cannot contain dynamic information, so static HTML pages cannot be based upon user input or server-side data sources. JSP is so easy and convenient and it enables a mixture of regular static HTML with dynamically generated content from servlets. [9]

4.4 Hardware Specification

Personal computer at least a 200 MHz

128 MB of RAM

Monitor VGA or higher resolution

Hard Disk a least 1.0 GB

Scanner, Digital Camera / Video Cam

5 Chapter 5 – System Design

5.1 Introduction

System Design is one of a phase in the V Model. In this stage the system requirements that defined in the analysis phase need to transform to a system characteristics. System design is divided to four main categories:

- System Architecture Design – Discuss how the subsystem is related to the processes and the networking component.
- System Functionality Design – Defined the data flow and program workflow structure of this subsystem.
- Database Design – Defined the structure of the database, relationship and the component that related each other.
- User Interface Design - Design the interface for this subsystem that including the user interface.

5.2 Overview of System Architecture

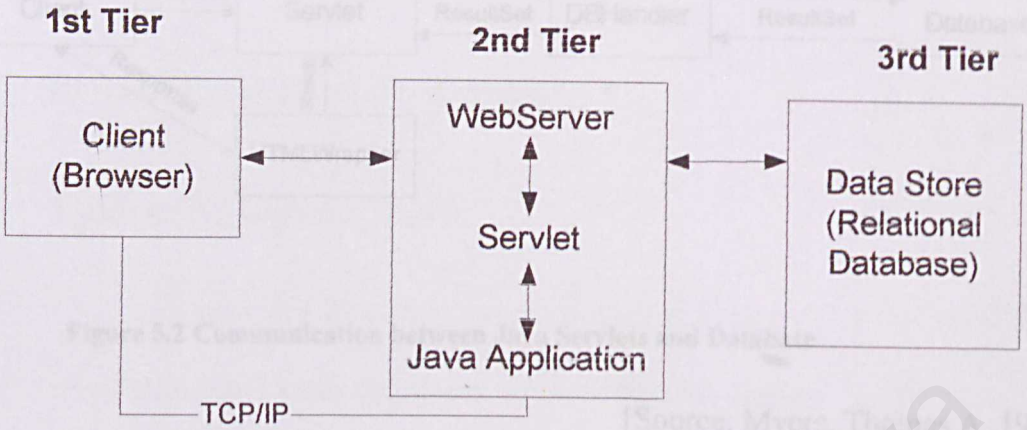


Figure 5.1 3-Tier Architecture of Virtual Business Subsystem

The conceptual architecture of the three-tier application applies when we split an application across three tiers are split into three logical components of the application: user interface, computational logic and data storage. In reality, the three-tier Web applications generally consist of a Web browser for the user interface, a Web server connected to a "middle tier" application, and a persistent store that is frequently a relational database.

Virtual Business Subsystem will be using JSP as the web development tool. After the middle tier receives client's requests, in the same tier, Java servlets will communicate with java classes to decide ways to process the data in order to generate desired output to users. Apart from using Java servlets, JavaBean can be used to communicate with the relational database. A simple illustration on both the ways abovementioned is displayed in Figure 5.2 and Figure 5.3.

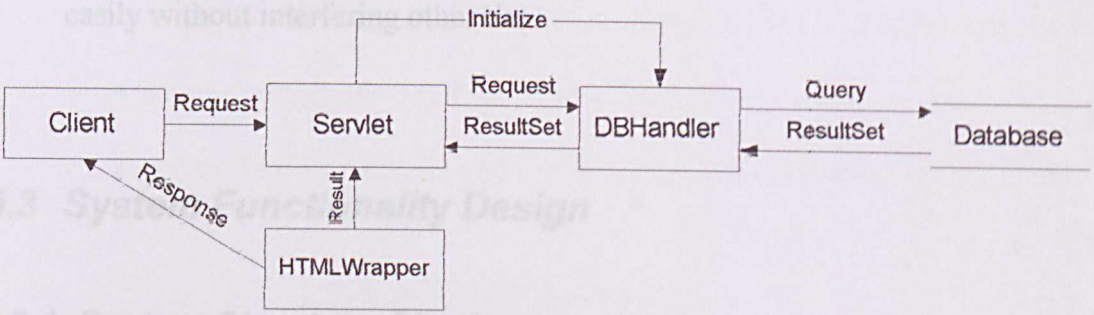


Figure 5.2 Communication between Java Servlets and Database

[Source: Myers, Thomas A ,1999]

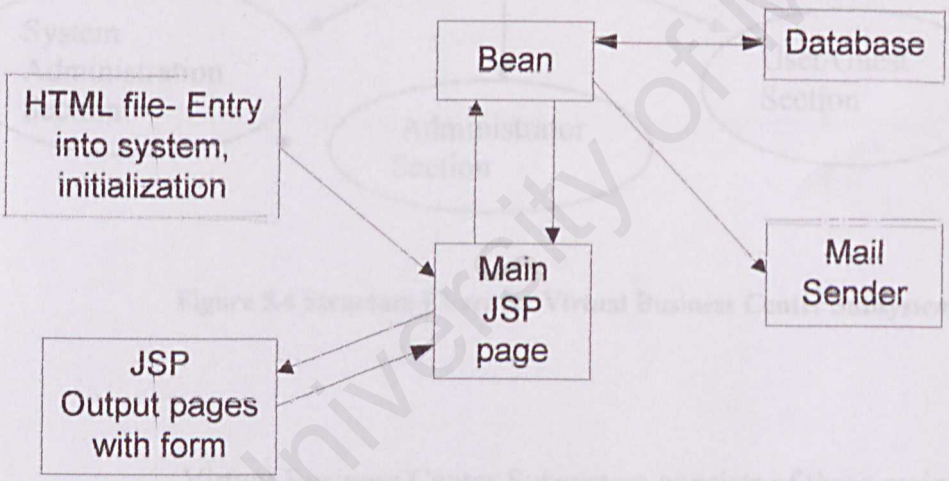


Figure 5.3 Communication between Java Bean and Database

[Source: Myers, Thomas A ,1999]

Figure 4-3: Communication between Java Bean and Database to get relevant output. The main purpose of having three-tier architecture is to assign main functionality to each tier to ensure no function overlapped. Different people could handle each tier using different languages. Therefore, whenever

there is error or system fault occurs, the problems can be detected and fixed easily without interfering other tier.

5.3 System Functionality Design

5.3.1 System Structure Charts

The objective of system structure chart is to show how the modules in Virtual Business Center Subsystem are related to each other.

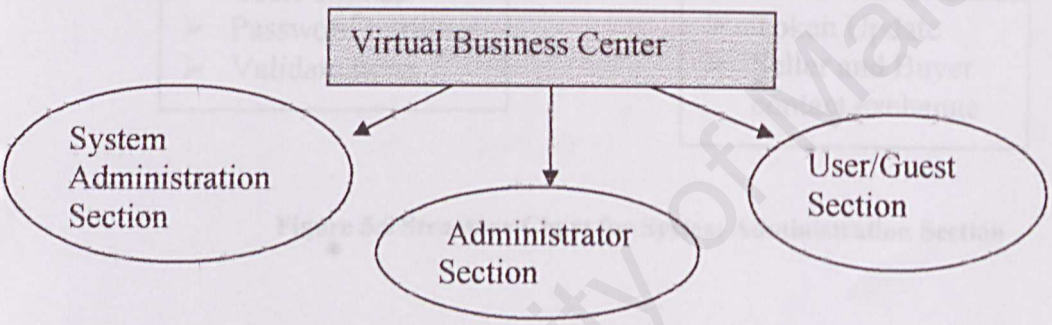


Figure 5.4 Structure Chart for Virtual Business Center Subsystem

Virtual Business Center Subsystem consists of three major parts, which are System Administration Section, Administrator Section and the User or Guest Section. Basically, the System Administration Section is to let System administrator to allow new user registration, send new password when users forger their password, validate user when they sign in, update users token account after completing the transaction and let the system automatically inter-change the seller and buyer contact information. Administrator Section is the section to allow administrators to manage the whole system which is approve

product setup, user interface setup, product period setup, approve application, remove user, cataloging, newest bulletin, shopping Cart, searching and request form setup. Lastly, the User or Guest Section lets users to access and to manage their personal profile and use the system as the end-users.

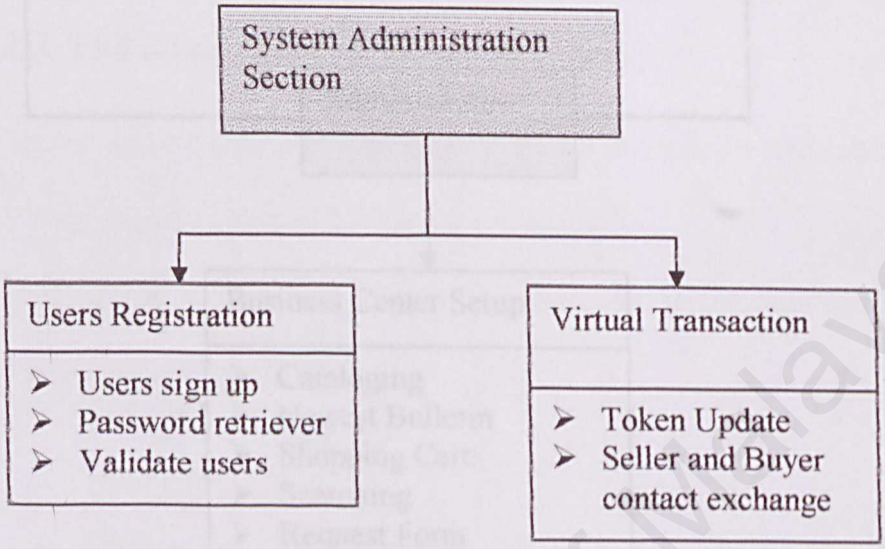


Figure 5.5 Structure Chart for System Administration Section

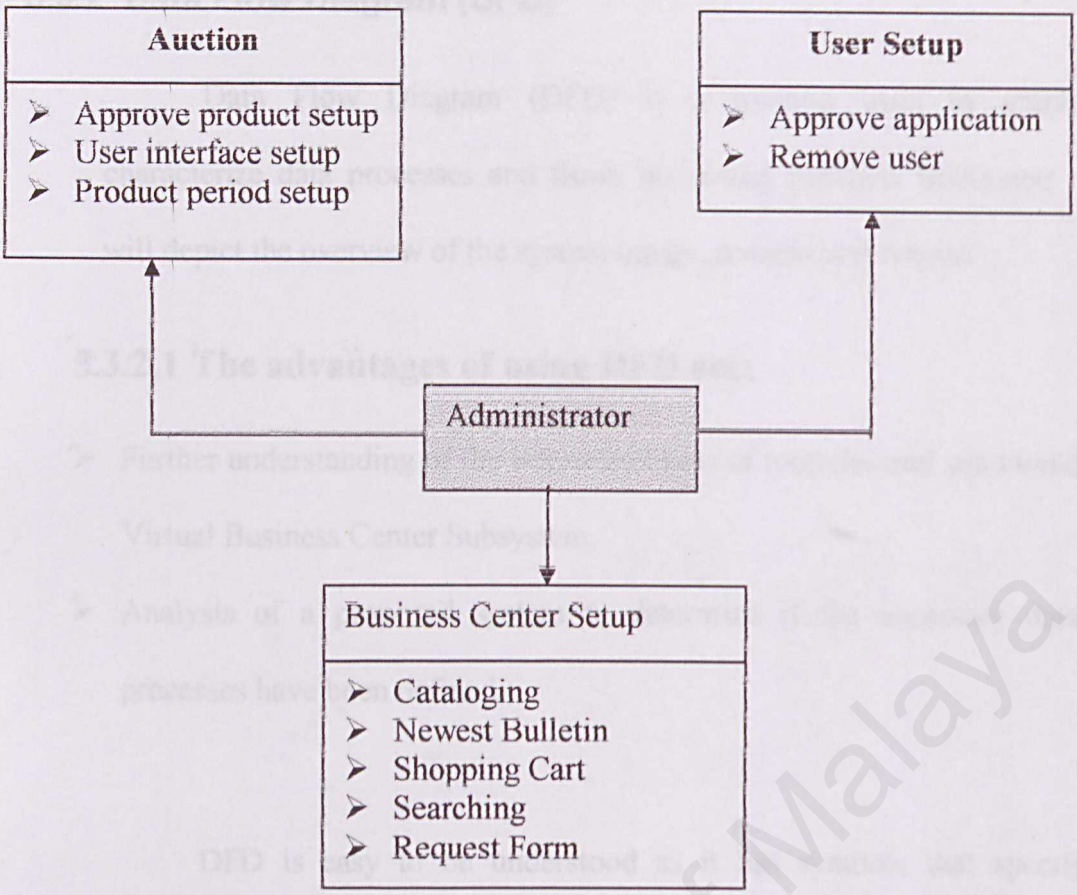


Figure 5.6 Structure Chart of Administrator Section

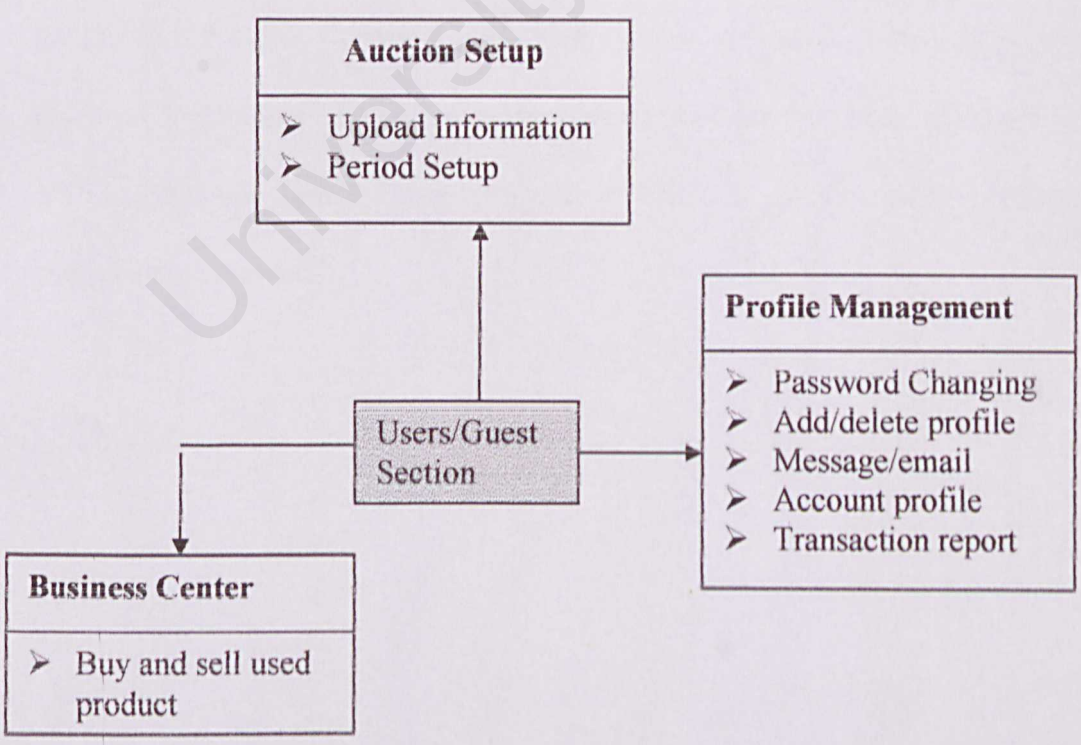


Figure 5.7 Structure Chart for Users / Guest Section

5.3.2 Data Flow Diagram (DFD)

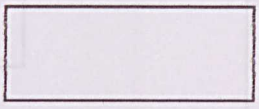
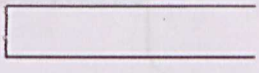
Data Flow Diagram (DFD) is a method used to graphically characterize data processes and flows in Virtual Business Subsystem. DFD will depict the overview of the system inputs, process and outputs.

5.3.2.1 The advantages of using DFD are:

- Further understanding of the interrelatedness of modules and sub modules of Virtual Business Center Subsystem.
- Analysis of a proposed system to determine if the necessary data and processes have been defined.

DFD is easy to be understood as it has symbols that specify the physical aspects of implementation. There four basic symbols in DFD: entity, flow of data, process and data stores (see Table 5.1).

Table 5.1 DFD Symbols

Symbols	Attribute
	Entity
	Flow of Data
	Process
	Data Store

The convention, which is used to design DFD are based on the work by C.Gane and T.Sarson. The data flow is conceptualized with a top-down perspective. So, the Context Level Diagram will be drawn, followed by the Diagram 0. Diagram 0 is an overview process of all the major modules in Virtual Business Center Subsystem that includes all the data stores, entities and process involved.

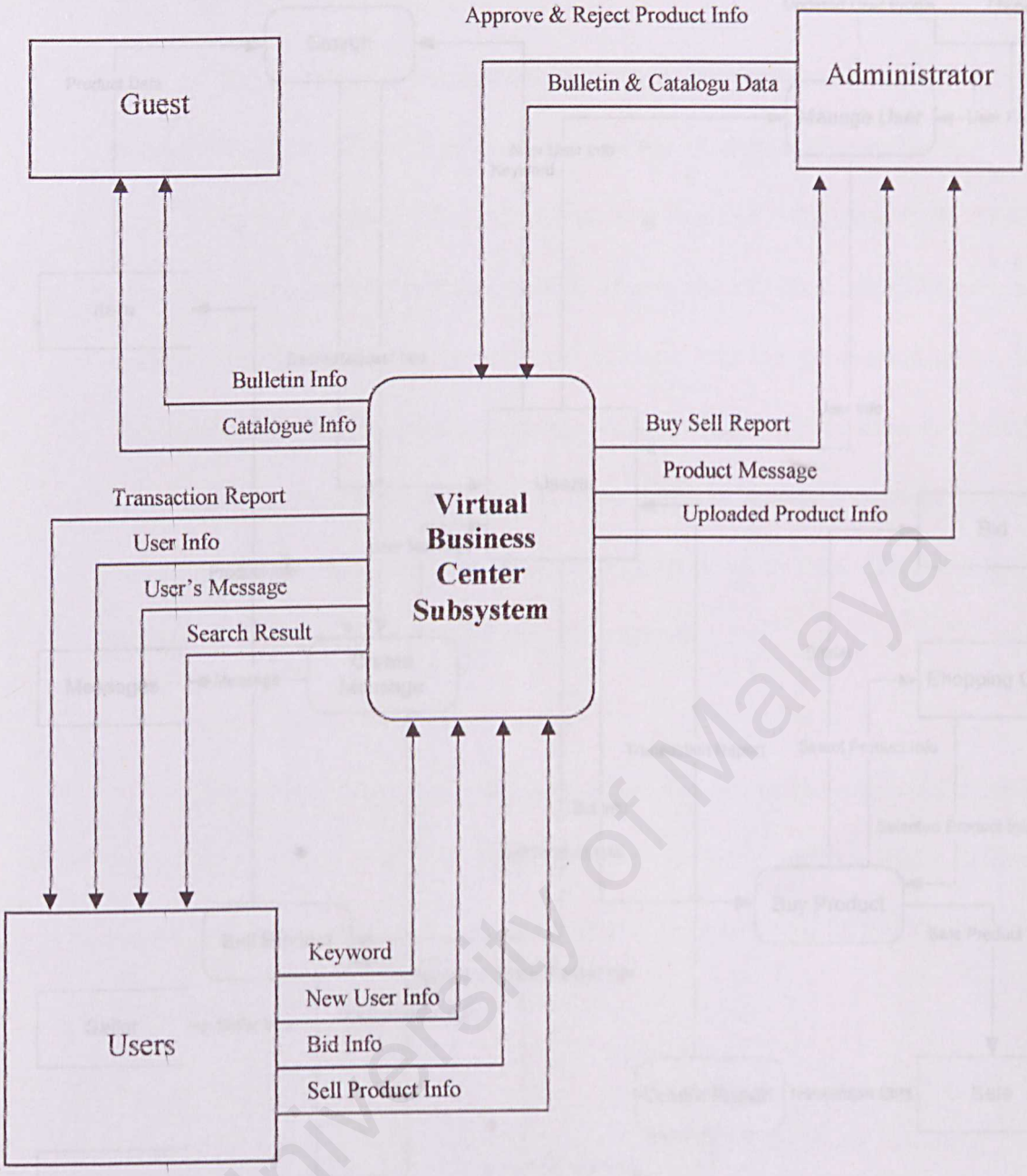


Figure 5.8 Context Diagram of Virtual Business Center Subsystem

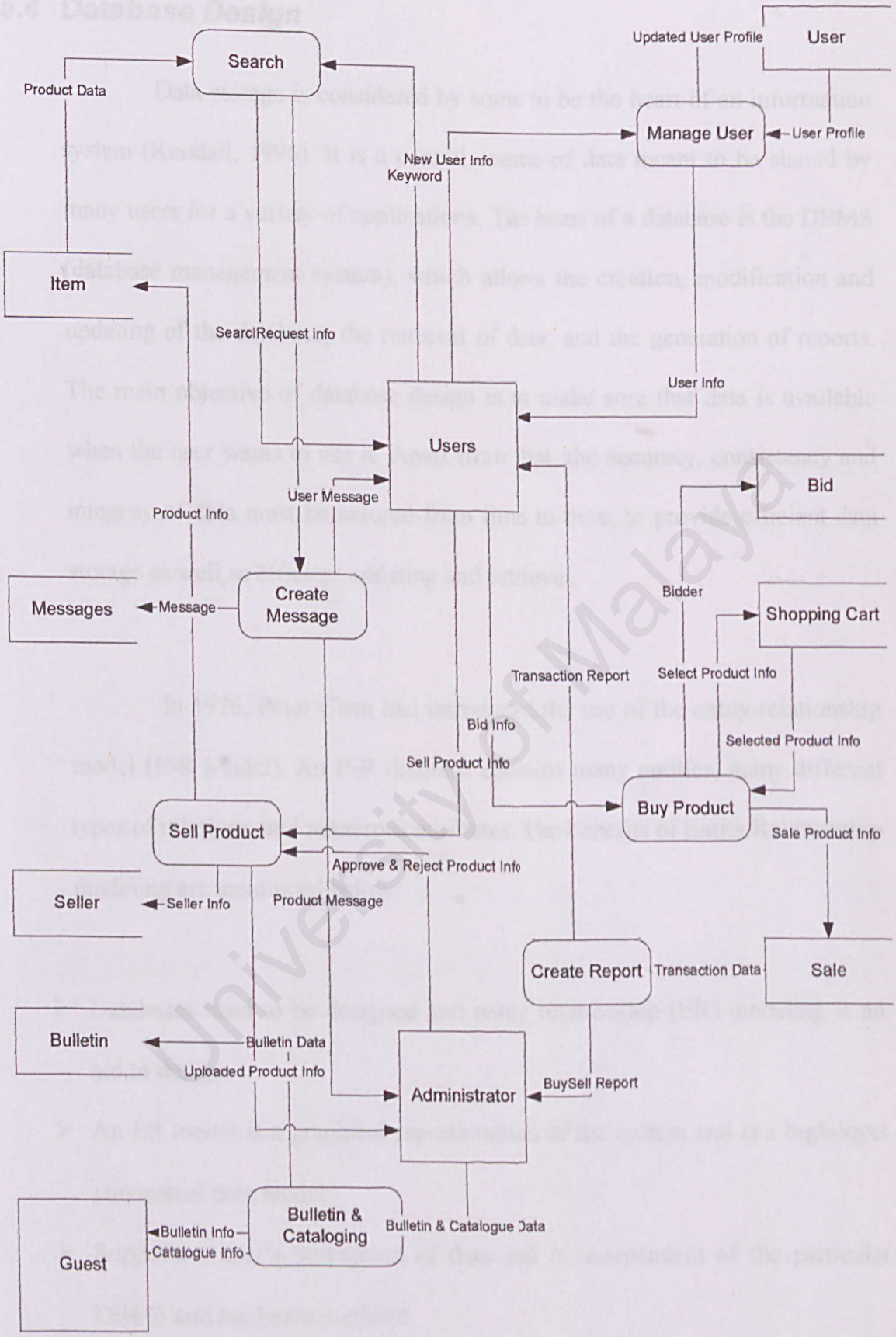


Figure 5.9 Zero Diagram Of Virtual Business Center Subystem

5.4 Database Design

Data storage is considered by some to be the heart of an information system (Kendall, 1996). It is a central source of data meant to be shared by many users for a variety of applications. The heart of a database is the DBMS (database management system), which allows the creation, modification and updating of the database; the retrieval of data; and the generation of reports. The main objective of database design is to make sure that data is available when the user wants to use it. Apart from that, the accuracy, consistency and integrity of data must be assured from time to time, to provide efficient data storage as well as efficient updating and retrieval.

In 1976, Peter Chen had introduced the use of the entity-relationship model (E-R Model). An E-R diagram contains many entities, many different types of relations, and numerous attributes. The benefits of Entity Relationship modeling are mentioned below:

- Databases need to be designed and entity relationship (ER) modeling is an aid to design.
- An ER model is a graphical representation of the system and is a high-level conceptual data model.
- Supports a user's perception of data and is independent of the particular DBMS and hardware platform.

5.4.1 Data Dictionary

Data dictionary or metadata can be defined as a main storage used for store data in an information system. Data dictionary are used to correct, documentation and resort the data. Data dictionary will be defined all element in the table for a database.

In Virtual Business Center Subsystem, one database had been defined namely eMarket and contained 9 tables, which are User table, Seller table, Item table, Bid table, Sale table, Message table, Shopping Cart table, Bulletin table and Token Reload Card table.

Database Name: **eMarket**

Table name: **User**

Description: **Store information about each user that accessing to the system.**

Table 5.2 Table of User Table

Field Name	Data Type	Description
UserID	Auto	System-generate unique identifier
Username	Varchar	Login name
Password	Varchar	Login password
Name	Varchar	User Name
ICNo	Varchar	User IC Number
MatrikNo	Varchar	User student number
DOB	Date	Date of Birth
Street address	Varchar	
City	Varchar	
State	Varchar	
PostalCode	Varchar	
Country	Varchar	
PhoneNo	Varchar	
Active	Boolean	Flag indicating an active user
RegisterDate	Date/Time	Registered Date
LastLogin	Date/Time	Date and time the user logged into the application

Table name: **Seller**

Description: Store **additional information about any registered user who is a seller – that is any user who makes an item available for sale.**

Table 5.3 Table of Seller

Field Name	Data Type	Description
SellerID	Auto	System-generate unique identifier
UserID	Long	Foreign key
Itemslisted	Long	Total number of item that this user has ever listed for sale
ItemActive	Long	Number of item that currently for sale
LastActivity	Date/Time	Date and time of the most recent time that this seller changed the items they for sale

Table name: **Item**

Description: **A place to store product that are being sold.**

Table 5.4 Table of Item

Field Name	Data Type	Description
ItemID	Auto	System-generate unique identifier
ItemName	Varchar	Descriptive name of the item
Description	Text	Textual description of the item
AskingPrice	Currency	Price that the seller desires
NotifyPrice	Currency	Price lever at which the seller should be notified
sellerID	Long	Foreign key indicating the seller of the item
Listingdate	Date/time	Date and time that the item was listed for sale
ExpirationDate	Date/Time	Date and time that the item will no longer be for sale
ItemStatus	Varchar	Current item status – can be blank, pending, or sold

Table name: **Bid**

Description: **Store bid record.**

Table 5.5 Table of Bid

Field Name	Data Type	Description
BidID	Auto	System-generated unique identifier
ItemID	Long	Foreign key, indicating the item being bid on
BidderID	Long	Foreign key, indicating the person bidding on the item
Timestamp	Date/Time	Date and time that bid was submitted
BidAmount	Currency	Amount that the buyer is willing to pay for the item
BidChange	Currency	Difference between current bid and previous bid

Table name: **Sale**

Description: **Store sale record.**

Table 5.6 Table of Sale

Field Name	Data Type	Description
SaleID	Auto	System-generated unique identifier
ItemID	Long	Foreign key, indicating the item being bid on
WinningBid	Currency	Final selling price of the item
BuyerID	Long	Foreign key, indicating the successful buyer of the item
SellerApproval	Boolean	Indicates that the seller has approved the sale
BuyerAcceptance	Boolean	Indicates the buyer has accepted the sale
CompletionDate	Date/Time	Date and time that the sale was completed

Table name: **Messages**

Description: **Store the entire message that generate by system or any other user.**

Table 5.7 Table of Message

Field Name	Data Type	Description
MessageID	Auto	System-generated unique identifier
userID	Long	Foreign key, indicating the messages is belong to who
Sender	Varchar	Indicates the person who send the message
Message	Text	The message form the system to each user
MessageDate	Date/Time	Message issue date and time
Status	Boolean	Indicates whether the message status read and unread

Table name: **ShoppingCart**

Description: **Store user's selected item that still not go to the check point yet.**

Table 5.8 Table of Shopping Cart

Field Name	Data Type	Description
ShoppingCartID	Auto	System-generated unique identifier
UserID	Long	Foreign key, indicating the person who shop the website
ItemID	Long	Foreign key, indicating the item is being selected to the cart
Price	Currency	Indicates the price of the selected item
ItemStatus	Varchar	Indicates the status of an item, can be have stock, on order, no stock
Active	Boolean	Indicates selected item to checkpoint

Table name: **Bulletin**

Description: **Store all newest bulletin that request by any users.**

Table 5.9 Table of Bulletin

Field Name	Data Type	Description
BulletinID	Auto	System-generated unique identifier
ItemName	Varchar	The name of the item asking
By	Varchar	Who is requesting
Quantity	Int	The requested quantity
RequestDate	Date/Time	The request date for the item
ExpirationDate	Date/Time	Administrator will determine the end date for the item to public on the main web site
Active	Boolean	Flag indicates the active status of an item

Table name: **TokenReloadCard**

Description: **Stores reload card information.**

Table 5.10 Table of Token Reload Card

Field Name	Data Type	Description
CardID	Auto	System-generated unique identifier
SeriesNumber	Varchar	The series number of the reload card
GeneratedDate	Date/Time	Date of the card issued
SoldDate	DateTime	Date of the card sold
ReloadDate	Date/Time	Date of the card reload with system
Price	Currency	The price of the reload card
Status	Boolean	Flag indicates the legal card
UserID	Long	This card reload by who

5.4.2 Relationships – Class Diagram

Relationship used to classification the relationships between tables. There are three types of established inter-table relationships which are one to one (1:1), one to many (1:N) and many to many (M:N). The diagrammatic

representation of this subsystem database relationship is illustrated in the Class diagram in Figure 5.11.

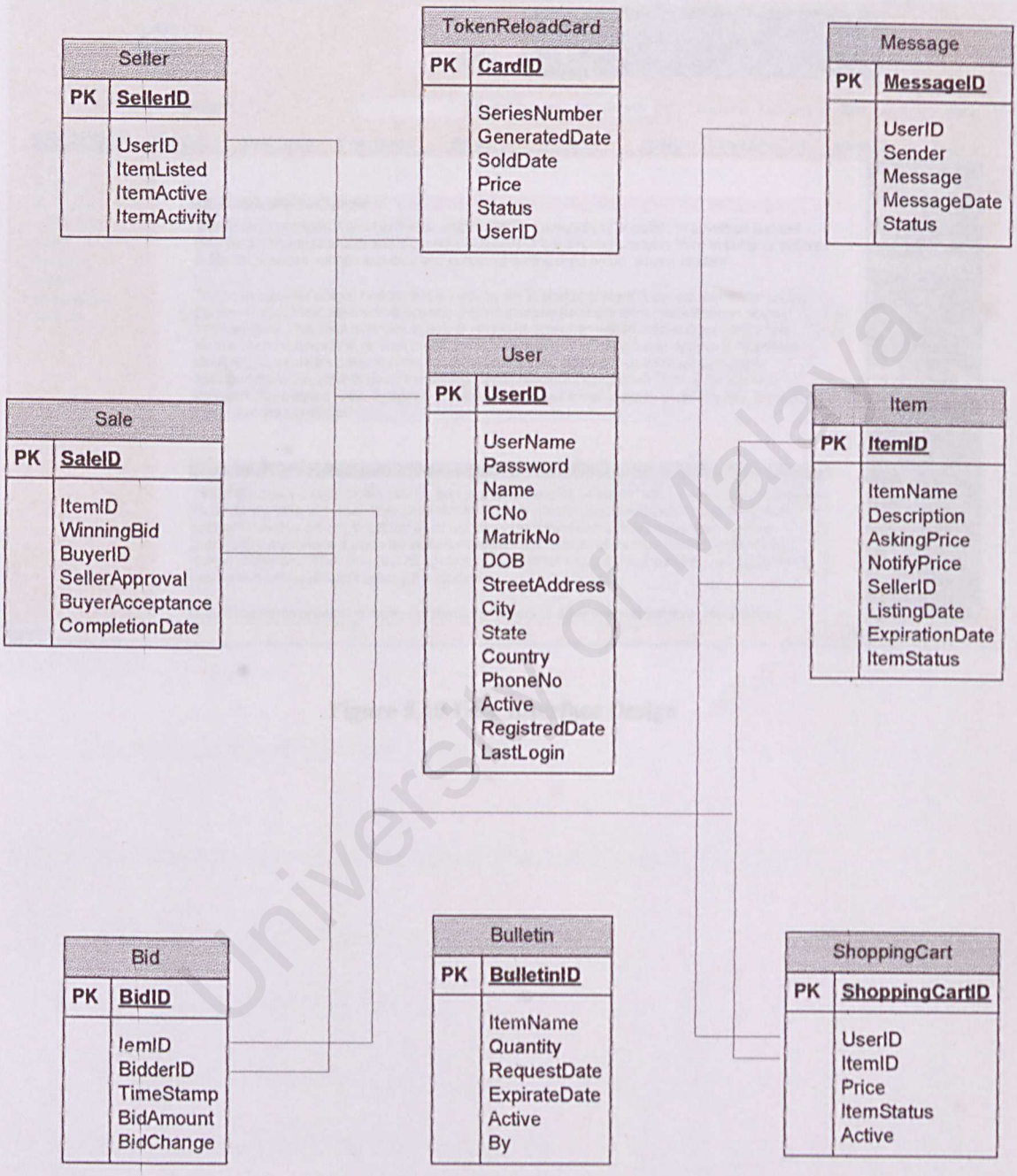


Table 5.11 Class Diagram of Virtual Business Center Subsystem

5.5 User Interface Design

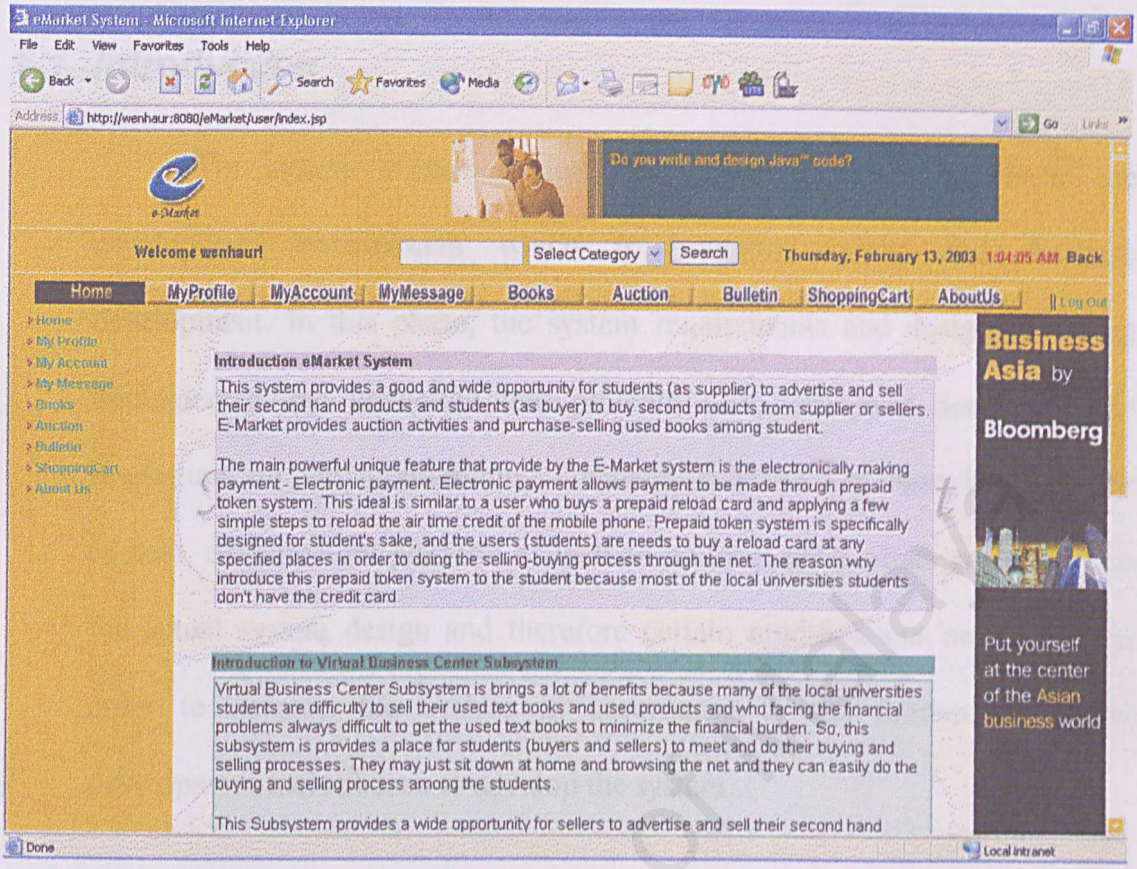


Figure 5.10 User Interface Design

6 System Implementation

6.1 Introduction

The system implementation stage revolves around stages in the development environment which is program coding and database development. In this phase, the system requirements and design are being implemented and converted into program code. However due to certain limitations on the programming language, selected Database Management System, development platform as well as protocol used which contradicts to the actual system design and therefore certain modifications are needed in order to develop the system in accordance to the limitations of the development tools chosen to develop the system.

6.2 Development Environment

6.2.1 Hardware Used in System Development Process

- AMD Athlon[tm] Processor 1.34 GHz
- Memory 512MB SDRAM
- Hard disk 19GB space
- Other standard desktop PC compliance

6.2.2 Software Used in System Development Process

- Windows XP Professional v2002 – Operating System and Server Platform
- J2SDK 1.4.0 – Require for Java Environment

- Apache Tomcat 4.0 – Web Server
- MySQL - Database (Freeware)
- PremiumSoft MySQL Studio – Interface for My SQL (Shareware)
- Internet Explorer 6.0 – Web Browser
- Edit Plus 2.0 – Code Editor (Freeware)
- Microsoft Word XP – Thesis Documentation

6.2.3 Operating System

The platform or operating chosen for the development of Virtual Business Center Subsystem is the Microsoft Windows XP. The rationality behind the choosing of Windows XP rather than window 2000 as the operating system as mentioned in Chapter 3 is solely based on the performance as well as the reliability of the operating system architecture, user friendly and good graphic presentation of interface. These features eventually make the Windows XP become an ideal operating system in future.

6.2.4 Installation Operation System

The installation of Windows XP may differ from the installation method of Home User versions of Windows operating system namely Windows 98 and Windows ME since both the system requires DOS environment to install the operating system. The same cannot be said to Windows XP because as the system disk is being booted, local installation files are being copied into the system and therefore the user will not interact in DOS environment. Instead, the user are being offered a simple interface which

is the menu prompting the user to input their installation options whether to clean install a new version of Windows XP into the system or upgrade the current operating system into Windows XP. Hence this offers the user more user friendly computing environment.

6.2.5 Web Server

The Web Server chosen for the development is the Apache Tomcat 4.0. Its provides the system administrator to configure the web server in accordance to their preferences such as the customization of the selection of protocol used, port configurations, scripting preferences, debugging options and other features in order for the server to accommodate the various functional requirements of the system. Apache Tomcat is selected to be the web server because it's a standalone web server that supports servlets 2.3 and JSP 1.2.

6.2.6 Installation Web Server

The first step before installation the web server on the machine is installing the JDK (Java Development Tools). Make sure you have JDK 1.3 or 1.4 installed and your PATH set so that both "java -version" and "javac -help" give a result.

Second steps are installing the Apache Tomcat. Download the software and unpack the zip file for the latest version. Edit install_dir/conf/server.xml and change the port attribute of the Connector element from 8080 to 80.

Windows XP automatically starts IIS on port 80. So, if you use XP and want to use port 80 for Tomcat, you'll need to disable IIS. Set JAVA_HOME variable to the base JDK directory, not the bin subdirectory.

6.2.7 Database

The database selected for developing in the eMarket system is MySQL. Chosen MySQL to be the database management because it's most popular Open Source SQL database, is developed and provided by MySQL AB. MySQL AB is a commercial company that builds its business providing services around the MySQL database. Beside that, anybody can download the MySQL software from the Internet and use it without need to pay money.

6.2.8 Installation Database

Download the software from the internet and unpack it. Start installs and creates the databases in accordance with your requirements. During the installation, please select the NT service. After installation, if the MySQL is not started automatically, please to go Control Panal\Administrative Tools\Services and select MySQL and start the services.

6.3 Coding Standard

Coding is an iterative process whereby it is done until the programmer obtains the desired results. There are two types of coding approach; one is top-down and the other one is bottom-up. The bottom-up coding is based on

coding some complete lower level modules and leaving the high-level modules merely as skeletons that are used to call the lower modules, whereas the top-down approach is the reverse.

Virtual Business Center Subsystem was developed modularly using bottom-up approach. The system was developed follow by modules. After each module is develop, combination between modules to be the main module. For example, the login module was the first module to be developed in the User Management Module. Combination between login module, new user register module, messages module and account module will produce the main module – User Management Module.

Java Server Pages (JSP) is the main scripting technology in building system's web page. JSP page is likely to be composed of a combination of three types of syntax – some parts JSP, some parts HTML tags, and some parts pure text. Each of them is not hard to distinguish. Each JSP section contained within <% and %>, <%! and %> and <%= and %> delimiters and statements falls in this block are called JSP script. Java is used as the scripting language as the JSP statements.

Apart from the server-side scripting, client-side scripting also is used to enhance the web page performance and interactivity. JavaScript is being used as the scripting language and delimited by the <SCRIPT>...</SCRIPT> tags put in the BODY tags and java script files.

Another useful technique being used is inserting pre-built blocks with "#include" statement in a JSP page. For example, both top banner and right banner menu are managed in separate files. Then, pages that required displaying a top banner, for instance, used this include statement to achieve its display function. This approach is able to minimize duplication and simplify the possible maintenance work in the future. If the maintainer wish to modify the top banner, he or she only require making modification on one file, and without modify all the relevant files.

6.3.1 Coding Example

Every developer has his own style on writing the program. Understand the coding style will help the reader easier to understand the program. The coding style that used in the whole system will be listed as below:

6.3.1.1 Pure JSP Script

This is the example coding taken form the "loginAction.jsp" to perform the login function for user.

```
<%//-----------------------Start Coding Here!-------------------------------
        while (rs.next()) {
                //Step 1: Check username
                if (username.equals(rs.getString("Username"))) {
                        dbGotValue = 1;
                        //Step 2: Check Password
                        if (password.equals(rs.getString("Password"))) {
                                dbGotValue = 2;
break;
}}}
//---------------------End Coding Here!---------------------------------
%>
```

Figure 6.1 JSP Coding

6.3.1.2 HTML coding

This is the example coding taken form the "index.jsp" to display the information to user.

```
<html>
<head>
<meta http-equiv="Content-Language" content="en-us">
<meta http-equiv="Content-Type" content="text/html; charset=windows-1252">
<title>eMarket System</title>
</head>
<BODY background="images/bg.jpg" onload="choosePic()" class=body>
<table class=table align=center border=2 bordercolor=#d8bfd8>
<tr class=header1>Introduction eMarket System</tr>
<tr><td colspan=2 bgcolor=#e6e6fa><p>This system provides a good and wide
opportunity for students (as supplier) to advertise and sell their second hand
products and students (as buyer) to buy second products from supplier or sellers. E-
Market provides auction activities and purchase-selling used books among
student.</P>
</td></tr>
</table></body></html>
```

Figure 6.2 HTML Coding

6.3.1.3 JavaScript Coding

Java script has been used widely in the system to do the form validation. Java script is choosing to perform this task because the language can be used in both IE and Netscape browser but VBscript can only be used in the IE browser. This is the example coding taken form the "Randow.js" to perform the random choose banner from the data store.

```
//----------------------start javascript here!-----------------------------------------
myPic = new Array("images/ban1.gif", "images/ban2.jpg", "images/ban3.gif",
"images/ban4.gif", "images/ban5.gif", "images/ban6.gif", "images/ban7.gif",
"images/ban8.gif", "images/ban9.gif");
imgCt = myPic.length;
//banner data store

function choosePic(){//function of random choose an images
        if(document.images) {
                randomNum = Math.floor ((Math.random() * imgCt));
                document.myPicture.src = myPic[randomNum];
}}
//----------------------end of script here!-----------------------------------------
```

Figure 6.3 Java Script Coding

6.3.1.4 Include Files

The technique was used to include files is showing below (taken from the "index.jsp file"):

```
<%@ include file="ban.html"%>
// include the file name ban.html in to the "index.jsp"
```

Figure 6.4 Include Files

6.3.1.5 Database Connection

The database driver used in the system is Java Database Connectivity (JDBC). The connection string used is showing below:

```
<%
        String connectionURL = "jdbc:mysql://localhost:3306/eMarket";
        Connection connection = null;
        Statement statement = null;
        PreparedStatement ps = null;
        ResultSet rs = null;

        try{
                //load the driver
                Class.forName("com.mysql.jdbc.Driver").newInstance();

                //make the connection
                connection = DriverManager.getConnection(connectionURL,
"wenhaur", "159");

                statement = connection.createStatement();
        }

        catch (Exception e){
                out.println(e.toString());              //catch errors and print them out
        }
%>
```

Figure 6.5 Database Connection String

6.3.1.6 Comment in JSP

There are three type of comment in JSP. The most type comment is in used in the program is type 1 in the example below. The reason is because the comment can be short and meaningful enough for the developer. Comment in type 2 will normally used when the developer will comment more than 1 line in the script block. And the comment type 3 is used when the developer want to document the comment in the final stage of the program writing. This

comment type become very special compared to other server side scripting language like ASP and PHP.

```
1. //  This will be comment in JSP
2. /*
      This will be comment in JSP
      This is the second line…
   */
3. /**  This comment can be documented in the future... */
```

Figure 6.6 Type of Comment in JSP

6.4 Component Diagram

A component diagram shows a collection of related components. Different authors may use component diagrams in different ways. Figure 6.7 shows the dependencies between the source code and the byte code in Java programming language. Before a computer can run a Java program, the computer will translate the coding into an intermediate language call Java bytecode. Bytecode is the platform-independent codes that interpreted by an interpreter on Java platform. The interpreter parses and runs each Java bytecode instruction on the computer. Compilation happens just once; interpretation occurs each time the program is executed.

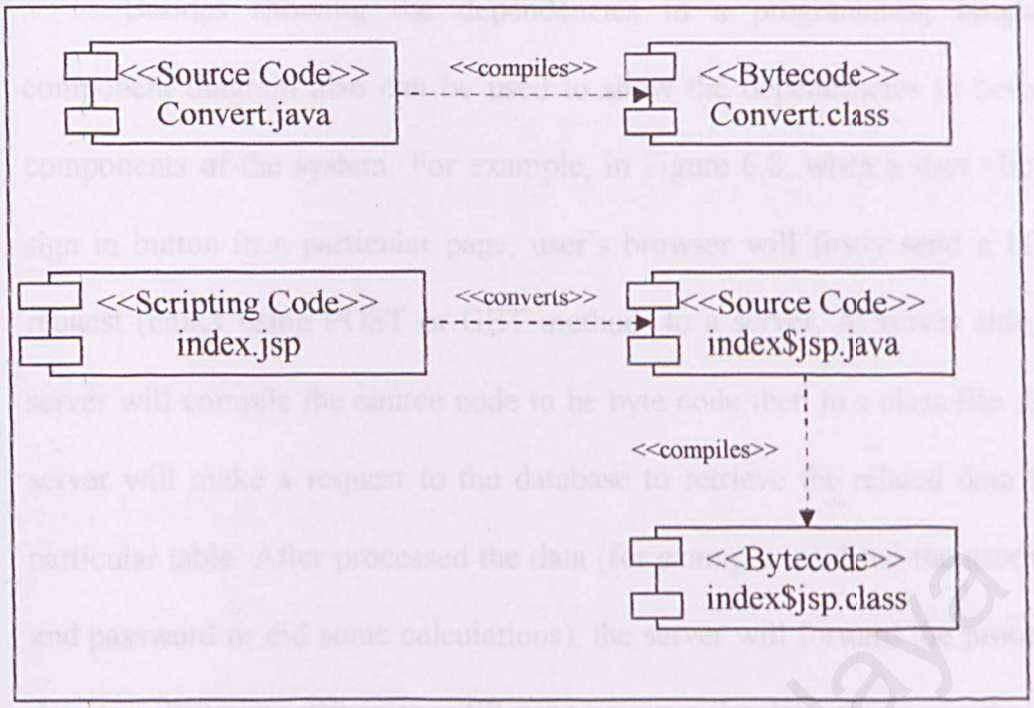


Figure 6.7 Component diagram – Dependencies in Java

As shown in Figure 6.7, Convert.java (source code) is compiled and becomes Convert.class (bytecode) that can be interpreted by Java interpreter (which is also referred to Java Virtual Machine, JVM). While in Java Server Pages, JSP, a JSP page (which contains scripting language) is converted to Java Source when it is involved for the first time (by calling the JSP page from client's browser) by JSP or Servlet container (is also referred to Apache Tomcat for this system). Then, the source code is compiled to Java bytecode.

Besides showing the dependencies in a programming language, component diagram also can be used to show the dependencies in between components of the system. For example, in Figure 6.8, when a user clicks a sign in button in a particular page, user's browser will firstly send a HTTP request (either using POST or GET method) to a server. At server side, the server will compile the source code to be byte code then to a class file. Later server will make a request to the database to retrieve the related data from particular table. After processed the data (for example validated the username and password or did some calculations), the server will forward the processed data to a JSP page. When the JSP page receives the data, the user either will successfully login or redirect the user to the login page for invalid user.

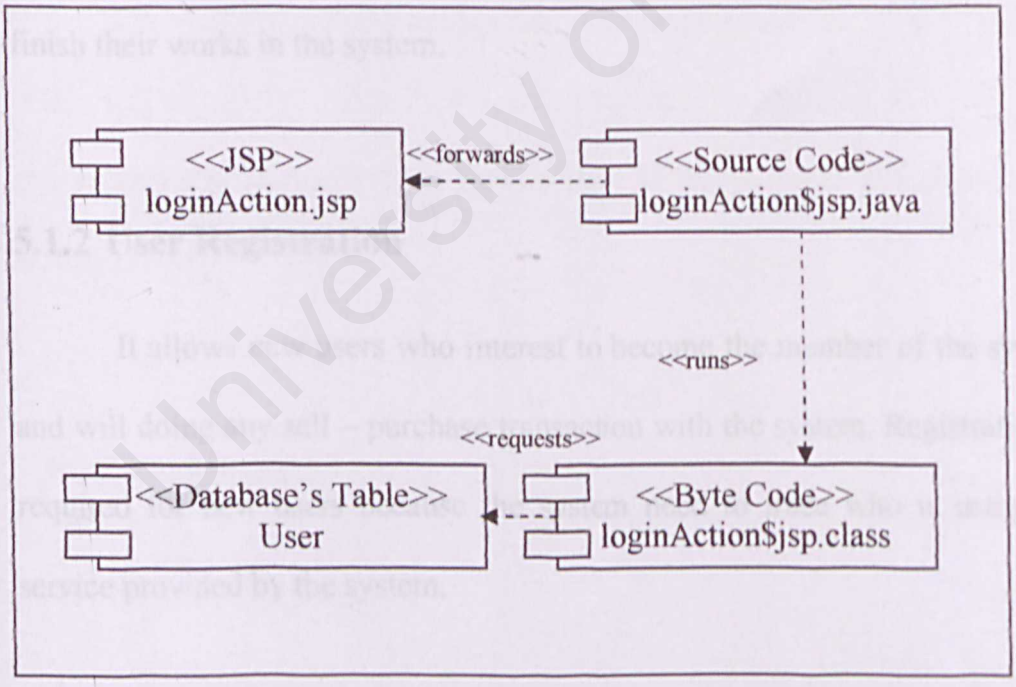


Figure 6.8 Component diagram – Dependencies in between components

6.5 Module Implementation

There are three main modules in Virtual Business Center Subsystem: User Management Module, Auction Module and Trading Module. Each module is consists of several functions.

6.5.1 User Management Module

6.5.1.1 Login & Logout

The Login function will perform the username and password checking before a user can login to the system.

The Logout mainly to cancel session of a user on the system after they finish their works in the system.

6.5.1.2 User Registration

It allows new users who interest to become the member of the system and will doing any sell – purchase transaction with the system. Registration is required for new users because the system need to trace who is using the service provided by the system.

6.5.1.3 Personal Profile & Change Password

Allows registered users to edit the profile and change their password as well. Users are allowed to update their personal profile such as the contact

information so that the system can have the correct information when they need to do some transaction with the users.

6.5.1.4 Message

This function is an additional service that provided by the system. The messages will inform the users when any transaction occur between the users and the system. This function can be upgraded to the auto notification by using the email server.

6.5.1.5 Personal Accounts

Users are allowed to top up their accounts through the system. Besides that, users can easily check their account balances through the web site. Also users can view the transaction reports such as the purchasing reports or the selling reports.

6.5.2 Auction Module

6.5.2.1 Search for Item

The system has provides the searching function to all registered and unregistered users. This function allows users to search for any of the used item in the database.

6.5.2.2 Auction

Registered users are allowed to bid any used item that posted by other users in the system. Users are not allowed to bid on his / her own item. After the posted items expired, the seller is either will extend the period of the item or he / she can sell it to the highest bidder. The system will automatically calculate the highest bid among the bidder.

6.5.2.3 Post Item for Sale

This function allows users to post a new item for the auction. Images upload is also available in this function.

6.5.2.4 Edit Posted Item

After the users posted an item, users are allowed to edit the details for that item.

6.5.3 Trading Module

6.5.3.1 Search for Books

The system also provides the searching service to all the registered and unregistered users to search the books. This function allows users to search for any used book that in our database.

6.5.3.2 Shopping Cart

Users can select any of the used books in the trading module and can add it into the shopping cart. Users are allowed to add more books or remove the books from the shopping cart before they proceed to the check out counter.

6.5.3.3 Request Form

Registered users are allowed to request any of the used books in the system by filling a special request form. The users will be notified through messages either the request is approved or rejected.

6.5.3.4 Sell Form

User can use the online Sell Form that provided in the web site to sell any of the books in the system. The user will be notified through messages either the request is approved or rejected, or when the system decides want to buy the books from the users.

6.5.3.5 Latest Bulletin

This function will list out all the used books that some users had made the request on those books. Only the registered users are allowed to sell the particular books in the system.

6.6 Conclusion

During system implementation, system requirements and designs were converted into program codes. Besides, it also involves development environment setting such as the operating system and the database server. Several software tools were used to deploy the design into machine-readable language and then in turn to produce the required applications.

7 System Testing

After the program had been coded, it is the time we need to test the program. Testing is one of the vital parts of system development. During this stage, the system is tested for errors and bugs. The main purpose of doing testing is to detect errors that may exist in the beginning of development. After found any bugs or errors, the process of fault remover are runs to remove any bugs before the system runs in the real time. Besides the system is tested to discover errors and bugs, it also aims to find out if system's requirements have been met.

In developing a large system, testing usually involves several stages. Therefore the testing proposed for the system can take place as many as 3 stages:

- Unit Testing
- Integration Testing
- System Testing

7.1 *Unit Testing*

The primary goal of unit testing is to confirm the unit of the program is coded correctly and it performs the function and logic what it is supposed to perform. This stage of testing verifies the component functions properly with types of input expected from studying the component's design.

The first step can be done in unit testing is to examining the code. The code for each component is reviewed and is compared to its documentation for misunderstanding, inconsistencies and other fault. This process is also known as code review.

Secondly, we can use the Control Object Testing technique to do the unit testing. Command buttons are clicked to test their functionality and text boxes are tested with different data types and also null value to make sure invalid data will not cause any fault.

After we test on different data types like numbers, characters or date is used to test certain function because some control objects will only accept certain data type, invalid data type can be traced by the system without causing any error.

Lastly, we can select the test case. Test cases are developed to ensure that the input is properly converted to the desired output. So, to test a component, input data and condition are chosen. Then the component is allowed to manipulate the data, and output is observed.

7.2 Example of Unit Testing

Table 7.1 Adding New Item for Sale

Step	Test Procedure	Expected Output	Test Result Analyzing
1	Post a new item to sale	The record is inserted into database	Record is inserted successfully.

Below is the sample coding that will perform adds a new item into database in the auction module (SellAction.jsp).

```
String sql ="INSERT INTO Stock SET ItemName='" +
Convert.ChangeString(request.getParameter("name1")) + "', Description='" +
Convert.ChangeString(request.getParameter("name2")) + "', AskingPrice='" +
request.getParameter("name3") + "', MinPrice='" + request.getParameter("name4")
+ "', SellerID='" + request.getParameter("SellerID") + "', ListingDate='" + now + "',
ExpirationDate='" + request.getParameter("name6") +
request.getParameter("name7") + "', ItemStatus='Active'";

statement.executeUpdate(sql); //update into database
```

7.3 Integration Testing

When the unit testing meets the objective, all are working correctly and no error found, it is the time to combine them together in a working system. This integration is planned and coordinated so that when a failure occurs, the failure can be found easily. There are a few technique can be perform in the integration testing: Bottom-up Integration, Top-down Integration, Bid-bang Integration, Sandwich Integration and Comparison of Integration Strategies.

The approach had been taken to system's integration testing was Bottom-Up Integration. This is one of the popular approaches that merge components to test the larger system. When this method is used, each component in lower level of the system is tested individually first. Then the

next components to be tested are those call the previous test ones. This approach is followed repeatedly until all components are included in the testing.

7.4 System Testing

System testing is about to ensure the system meets the user requirements. There are several steps in testing a system:

- Function Testing
- Performance Testing
- Acceptance Testing
- Installation Testing

7.4.1 Function Testing

A function testing check that the integrated system performs its function as specified in the requirements. Therefore, use cases can be used as a guild for the function testing.

Table 7.2 Use Case – User Management Module

Use Case	Activities Tested	Expected Result	Result
Login	Enter nothing and click login button	Cannot be submitted. JavaScript prompted error message.	As expected
	Enter non-alphabet and non-numeric character or enter less than 6 characters for the password field.	Cannot be submitted. JavaScript prompted error message.	As expected
	Enter a correct username and password and click login button	No error message and login is successfully	As expected
	Enter a incorrect username and password and click login button	Error message is prompted	As expected
	Enter a correct username but incorrect password and click login button	Error message is prompted	As expected
Logout	Click Logout	No error message and logout is successfully	As expected
	Click other page after click Logout	Some of the links are not display. And all button are disabled to prevent un-login user to submit	As expected
Register / Edit Profile	Key in all the fields correctly and click Register button	No error message and registration is successfully	As expected
	Key in all fields correctly but put spaces or symbols in username or password	Error message is prompted	As expected
	Key in an invalid email addresses	Error message is prompted	As expected
	Key in all fields correctly but empty for the any fields that are not required	No error message and registration is successfully	As expected
	Key in all fields correctly	Error message is	As expected

	but empty for the any fields that are required	prompted	
	Key in either Tel or Mobile Phone fields or both.	No error message.	As expected
	Key in nothing in Tel and Mobile Phone fields.	Error message is prompted	As expected
Change Password	Key in nothing and click Change Password button	Error message is prompted	As expected
	Key in less than 6 characters and click Change Password button	Error message is prompted	As expected
	Key in the field with numeric and click Change Password button	No error message and password changed successfully	As expected
Top up Account	Key in the field with non-numeric and click Top up button	Error message is prompted	As expected
	Key in the field not 8 numbers and click Top up button	Error message is prompted	As expected
	Key in the field with numeric and click Top up button	No error message and token top up is successfully	As expected
Message	Delete any messages	No error message and message delete successfully.	As expected
	View messages by click the Next and Previous link.	No error message.	As expected

Table 7.3 Use Case – Auction Module

Use Case	Activities Tested	Expected Result	Result
Post New Item	Key in all the fields correctly and click Add New button	No error message and item added successfully	As expected
	Key in nothing and click Add New button	Error message is prompted	As expected
	Enter non-numeric for the Asking price and minimum price.	Error message is prompted	As expected
Bid	Enter bid amount correctly	No error message and bided successfully	As expected
	Key in non-numeric	Error message is prompted	As expected
Purchase Items	Click at purchase link.	A conform message should display.	As expected

Table 7.4 Use Case – Trading Module

Use Case	Activities Tested	Expected Result	Result
Request Form	Key in all the required fields correctly and click Request button	No error message and request form sent successfully	As expected
	Key in nothing and click Request button	Error message is prompted	As expected
	Enter non-numeric for the Price Expectation.	Error message is prompted	As expected
Sell Form	Key in all the required fields correctly and click Submit button	No error message and request form sent successfully	As expected
	Key in nothing and click Submit button	Error message is prompted	As expected
	Enter non-numeric for the Place your price button.	Error message is prompted	As expected
Shopping Cart	Click at Add to shopping cart	Only one book can be add in for the same Book ID	As expected
	Click at the link called Remove.	A conform message should display.	As expected
	Click at the Confirm Buying button without check the check box	Error message is prompted	As expected
	Click at the Confirm Buying button with check the check box	There are 2 situations will occur: Purchase Book Successfully and Purchase Book Not Successfully.	As expected
Purchase Books	Click at link called Request for This Book and place the price with non-numeric.	Error message is prompted	As expected
	Click at link called Request for This Book and place the price with numeric.	No error message and request form sent successfully	As expected
Sell Books	Click at link called Sell This Book to Us and place the price with non-numeric.	Error message is prompted	As expected
	Click at link called Sell This Book to Us and place the price with numeric.	No error message and sell form sent successfully	As expected
Purchase Books	Click at purchase link.	A conform message should display.	As expected
	Click at Remove link	A conform message should display.	As expected

7.4.2 Performance Testing

After have convinced that the functions work as specified, the performance test compares the integrated components with the non-functional requirements. These requirements, including user-friendliness, correctness, functionality, reliability, flexibility, efficiency constrain the way in which system function are performed.

7.4.3 Acceptance Testing

Acceptance testing is done to make sure that the system meets customer understanding of the requirements, which may be different from the developer. This testing will be done only when the system is delivered to the customer.

7.4.4 Installation Testing

Installation testing is the final stage for the system testing. The testing required the whole system delivered to the customer and install the system at customer site. The installation testing performs testing on the integration of the software which had been developed and hardware on the customer site. The testing is required because we need to make sure after the system integrate with the hardware, has perform properly on the customer site.

7.5 Conclusion

Testing on the system had been done successfully. Testing is important for ensuring the functionality of the system has runs correctly follows the user requirement.

8 System Evaluation

System evolution will document the result which had been developed (Virtual Business Center Subsystem). This chapter will cover the problems encountered during the development process from the beginning till the end of the project, the solutions to the problems, the benefit or strength and the limitation of the system being develop and the future enhancement for the system. Lastly, conclusion will conclude based on the whole project.

The documentation for the system evaluation of Virtual Business Center Subsystem will cover some topic as listed below:

- Problems faced and the solution applied to it
- The strengths and limitation of the system
- Future enhancement for the system in the future
- The conclusion of the whole project

8.1 Problems faced and solutions applied to it

During the process of developing any kind of project, there must come with some difficulty to the developer. It is the same situation when I developing the system, which is facing many difficulty from the scripting language of this system (JSP). The main reason is JSP is a new technology for me. This made the development process become very slow.

I have listed some of the main problems that occur and solutions to overcome it:

8.1.1 Lack of the experience in developing huge system

The main problem for a developer when developing a complete system is the experience. There are difficulty for us to define the project scope and the logic flow of the system. In order to obtain the experience of developing a complete system, it cannot just read the information we get either from the internet or from books. Although the eMarket system (Virtual Business Center Subsystem + Administrator Subsystem) is done by 2 person in group but there faced problems when the process development started. We don't have the real concept of how actually a real system runs.

In order to overcome these problems, I use the experience from the industrial training which I had done in last year, where I involve in testing on the ERP system. Beside that, Virtual Business Center Subsystem as my thesis title also come from the there which is the ideal is come from existing system such as ERP system and eProcurement system. The ideal is also come when I doing the case study on the internet for the auction module.

8.1.2 Lack of knowledge in JSP (Java Server Page)

JSP (Java Server Page) for us is a new scripting technology beside ASP (Active Server Page) where I had some experience of ASP. This scripting language brings a lot of problems to me while developing the system. This is

because in order to work within the java environment, we need to configure much more than if compare with using ASP. Beside that, we don't have the basic of the java programming at all.

This problem have been solved very soon because I have study a lot about the basic requirements in order to use the JSP. Discussion had been made with my partner and my friends to understand better about the language. In order to be convenient to me, I have bought a reference book for the purpose of writing JSP coding, and really I had read many of the example from the book and the source from internet.

8.1.3 Lack of the technique for designing the interface

This subsystem is mainly developed for the user side. Lack of the technique to design an interactive interface is a main problem. As developing for user needs very beautiful and dynamic web pages that can attract customer or user to visit the web side.

I had been visits a lot of web sides through the internet and take a look of the web side design. This is quite useful for me to develop a suitable web side to my system. Beside that, I had asked for help for my friends to give their opinions to the web pages after I come out the interface.

8.1.4 Time constraint

The time constraint becomes one of the main problems that I need to overcome. Besides need to develop the system, the developer also needs to concentrate on his study. Mainly, this was due to lack of experience in developing system and causing used too much of time in doing the researches.

Therefore I had rescheduled my time for study and time for develops the system. There are a few periods that I used to develop the system are the semester break between semester 1 and semester 2, the mid term breaks for the semester 2. During the holidays, I can put more effort on the system compare to during the study week.

8.2 System Strengths

There are some strength that can be found from the system if compare with other existing system. There are listed below:

8.2.1 Introduce to electronic payment

In order to let every student have the same priority to buy and sell the used product through the web portal, we have the main powerful unique feature that provide by the e-Market system is the electronically making payment — Electronic payment. Electronic payment allows payment to be made through prepaid token system. This ideal is similar to a user who buys a prepaid reload card and applying a few simple steps to reload the air time

credit of the mobile phone. Prepaid token system is specifically designed for student's sake, and the users (students) are needs to buy a reload card at any specified places in order to doing the selling-buying process through the net. The reason why introduce this prepaid token system to the student because most of the local universities students don't have the credit card.

8.2.2 Second hand product web portal

This system provides a good and wide opportunity for students (as supplier) to advertise and sell their second hand products and students (as buyer) to buy second products from supplier or sellers. E-Market provides auction activities and purchase-selling used books among student. By using the web portal, student can easily sell their used product and also can easily buy for books with lower price.

8.2.3 Request form provided

This feature is special design for those who are looking for book that the system doesn't have the book record. This is a better way to look the book compare to keep on asking his / her friend or senior for the book.

8.2.4 Integrate with other system

This system can be integrated in any local university to provide a second hand product web portal to student.

8.3 System limitations

8.3.1 Security

The password is not encrypted when it is posted from user's browser or stored in database and this will result in high vulnerability of password.

8.3.2 No Password retriever

The system does not include the service for retrieving back the forgotten password to user when the user requests for it. Therefore, if the user have forgot their password, there need to contact the system administrator for a new password.

8.3.3 Auto email notification

The system does not include the mail server where the system can send messages to user that have transaction with the system such as when you are the first timer login to the system, the user will received a welcome message.

8.3.4 No rules and regulation

There are no any rules and regulation in the system. Anybody who is registered is able to do the transaction and can refuse any successfully transaction that involves them. There are also doesn't have any action will taken to the black listed user.

8.3.5 No database backup

There is no database backup service provided from this system. This will reduce the reliability and integrity of the system when the database corrupted.

8.3.6 Less flexibility

There are less flexibility of the auction and trading modules. User is not allow to cancel the requested form in the trading module and cannot made change the decision to second highest bidder for a posted item when the highest bidder refuse to complete the transaction in auction module.

8.4 Future enhancement

In this project, even the project is fulfilled the user requirements and the functionalities of the system, but it still can keep on enhance in order to have a better system. Following are some of the enhancements can be done to the system in the future:

8.4.1 Increase the security

Encrypt and decrypt of sensitive information such as password. Password should be encrypted it is sent to server and stored in the database.

8.4.2 Password retriever

Develop a module that enable user to retrieve back the forgotten password by sending the password to the client email.

8.4.3 Auto email notification

Add on a mail server to manage the auto email notification to user the transaction completed.

8.4.4 Database backup

Back up the database periodically to increase the reliability and integrity of the data

8.4.5 Add more flexibility to the auction and trading module

Allows user to cancel the requested form in the trading module and make changes the decision to second highest bidder for a posted item when the highest bidder refuse to complete the transaction in auction module.

8.5 Project Conclusion

After few month of the development, the system, "Virtual Business Center Subsystem" can be said is successfully done. The system is considers has meet all defined objectives. The system also has fulfilled all the functional requirement, non-functional requirement, software requirement and hardware

requirement. The methodology chooses was V Model for the process of the development for this system. The methodology has gives a lot of guide to the developer so that the system can be done without facing any big problems.

The creation of this type of project has brings a lot of benefits. It's brings a lot meaningful experience especially in developing a huge system, experience of how to communicate and corporate with other people on doing a big project. It's also carried out many useful experiences on using the IT technology especially for the developer's future. On the other hand, the project also gives a chance to the developer to practice the programming skill, let the developer learn how to install the required software and hardware and the configuration on the software it self. This kind of experience sure will let the developer get a job easier on the next day.

Lastly, although the system had been done successfully, they are still a lot of the limitation on the system. After consider the time constraint, the developer have to leave the limitation to the future enhancement to improve it so that the system can perform better functionality in the future. Overall, the developer discovered that the personal, analysis and other related skill with him are still need to improve for better performance in the future project.

9 Appendix A

9.1 Installation Guide

9.1.1 Server Side

9.1.1.1 Minimum Hardware Requirement

- Pentium III 500 MHz
- 128 MB RAM
- pointing device
- keyboard

9.1.1.2 Minimum Software Requirement

- Microsoft Windows 2000 Server or Microsoft Windows 2000 Professional or Microsoft Windows XP
- MySQL
- JDBC driver for MySQL
- Java 2 Platform, Standard Edition, J2SE version 1.3 or above
- Apache Tomcat version 4.0 or above

9.1.1.3 Installation Instruction

- Download and install Java Software Development Kit (JDK). Install the J2SDK according to the instructions included with the release.
- Set an environment variable JAVA_HOME to the pathname of the directory into which you installed the JDK release.

- Download and install Apache Tomcat. Install the Apache Tomcat according to the instructions included with the release.
- Select the JDK's pathname when prompted. Be sure to check the 'Install NT Service' when prompted. This will enable windows to start the Apache Tomcat Server as a service every time the computer is started.
- Download and install JDBC driver for MySQL. Install the driver according to the instructions included with the release.
- Download and install MySQL. Install the database according to the instructions included with the release.
- Download and install PremiumSoft MySQL Studio. Install the driver according to the instructions included with the release.
- Setup the database. Copy the database from the CD given named **eMarket** to directory (install_dir/mysql/data/). Make sure the attribute of the files READ_ONLY is unchecked.
- Open PremiumSoft MySQL Studio. For the first time please click at the "Connection" button to build or establish the connection with MySQL. Later please set up a user by click at the "Manage Users" button. Click at a "Add User" and enter the user Name: wenhaur, Host: (computer name or IP addrease), password: 159. After successfully create the user, click at the "Grand All" button for the Global Privileges.
- Setup the web server. Copy the source code to hard drive.
- Edit stall_dir/Apache Tomcat 4.xx/conf/server.xml. Add this line within the <Host> tag.

```
<Context path="/eMarket" docBase="c:\eMarket" debug="0"></Context>
//assume the eMarket folder is copied to the c drive.
```

- Save the server.xml and restate Tomcat. To restate the server (Tomcat), go to control panel → administrator → double click at Services → select Tomcat from the list and right click to chose the restart to restart the server.
- Testing the server. Open an internet browser and go to address http://localhost:8080/eMarket/user/. If the browser display the web site without any error, that's mean the web server is setup successfully.

9.1.2 Client Side

9.1.2.1 Minimum Hardware Requirement

- Pentium 133 MHz
- 64 MB RAM

9.1.2.2 Minimum Software Requirement

- Any operating system
- Any browser (best view in IE 6 in 768x1024)

9.2 *User Manual*

Virtual Business Center Subsystem is one part of the eMarket system. This system is design especially for the user side. The home page for the system is "index.jsp". The user manual can divide into 2 category of user: registered and unregistered user.

9.2.1 Structure of Virtual Business Subsystem Home Page

Home Page

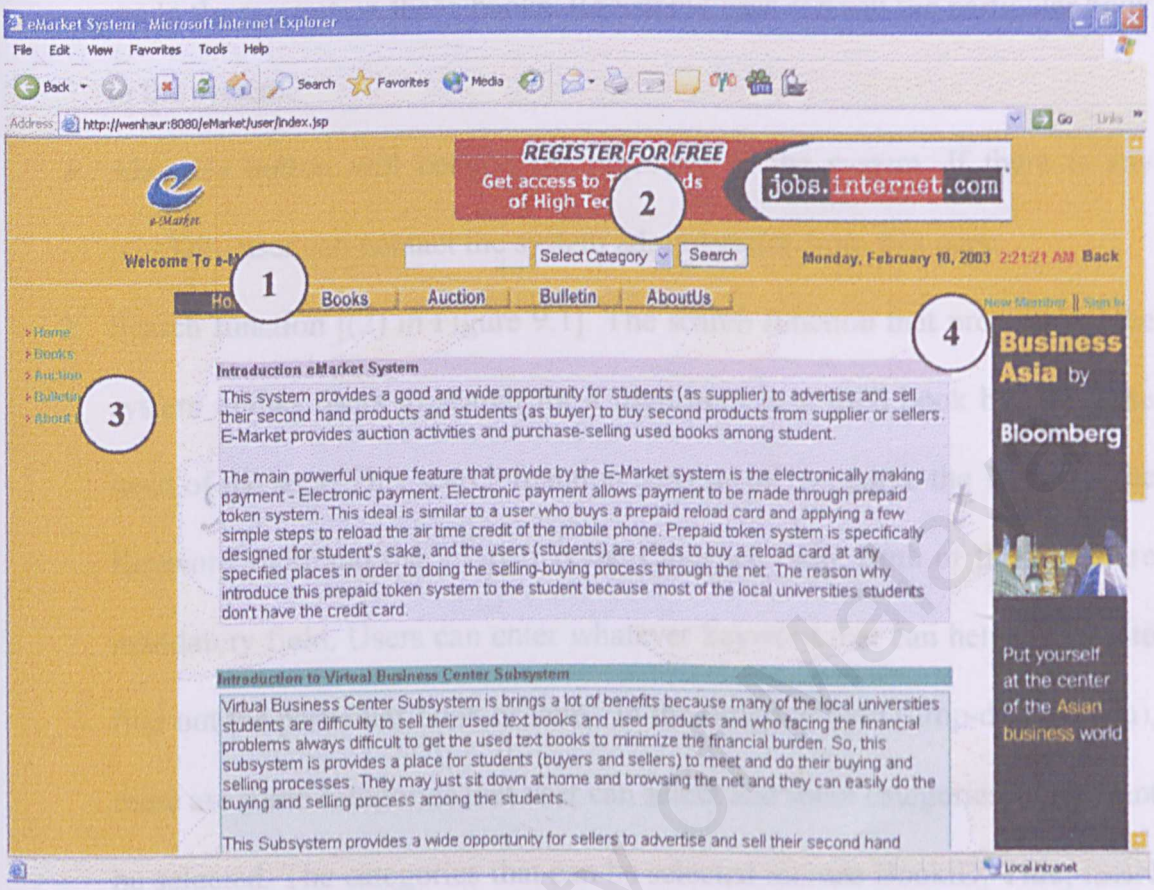


Figure 9.1 Home Page for eMarket System and Virtual Business Center Subsystem

Descriptions of the Figure 9.1:

1. Home button, Books button, Auction button, Bulletin button and AboutUs button [(1) in Figure 9.1] will be the basic function that provided by the Virtual Business Center Subsystem for an unregistered user.

- Click at Home button will go back to the home page.
- Books button is a link for a user to search a used book in the database and view any existing used book in our system. User is only allowed to view the books information.
- Auction button is a link for a user to search and place a bid on an item. Here, the user is limited to view the item information and the current bid amount for the item.

- Bulletin button is a link that allows user to view the list of the wanted books from other user. The list of the used books is the books that some users had made the request on those books. Registered user can sell the particular book to the system.
- AboutUs button will contain the objective of the system. If there is any problem, user can contact the system administrator from this page.

2. Search function [(2) in Figure 9.1]. The search function that provided in the system allows users to search for a used item or a used book based on the need of the user. This search function consists of two parts: the 1st part is the Keyword field and the 2nd part is the Category field. Both of the fields are mandatory field. Users can enter whatever keyword that can help him/her to find out the particular book or item. In the category field (drop-down menu), there are some categories that user can select and some categories that cannot be selected. The categories that can be selected include BookID, Title, ISBN and Author for Book category; Stock ID, Item Name, Description, Price, Seller ID, Listing Date and Expiration Date for the Item category. The other categories if selected, an alert message will prompt out.
3. Navigation links [(3) in Figure 9.1]. These are the links that same with the description in the first point above.
4. The "Sign In" and the "New Member" links [(4) in Figure 9.1]. As a registered user, you can click at the "Sign In" and login to the system directly. If you are a new user, you can simply click at the "New Member" to register with the system.

9.2.2 Unregistered User – User Management Module

User Login

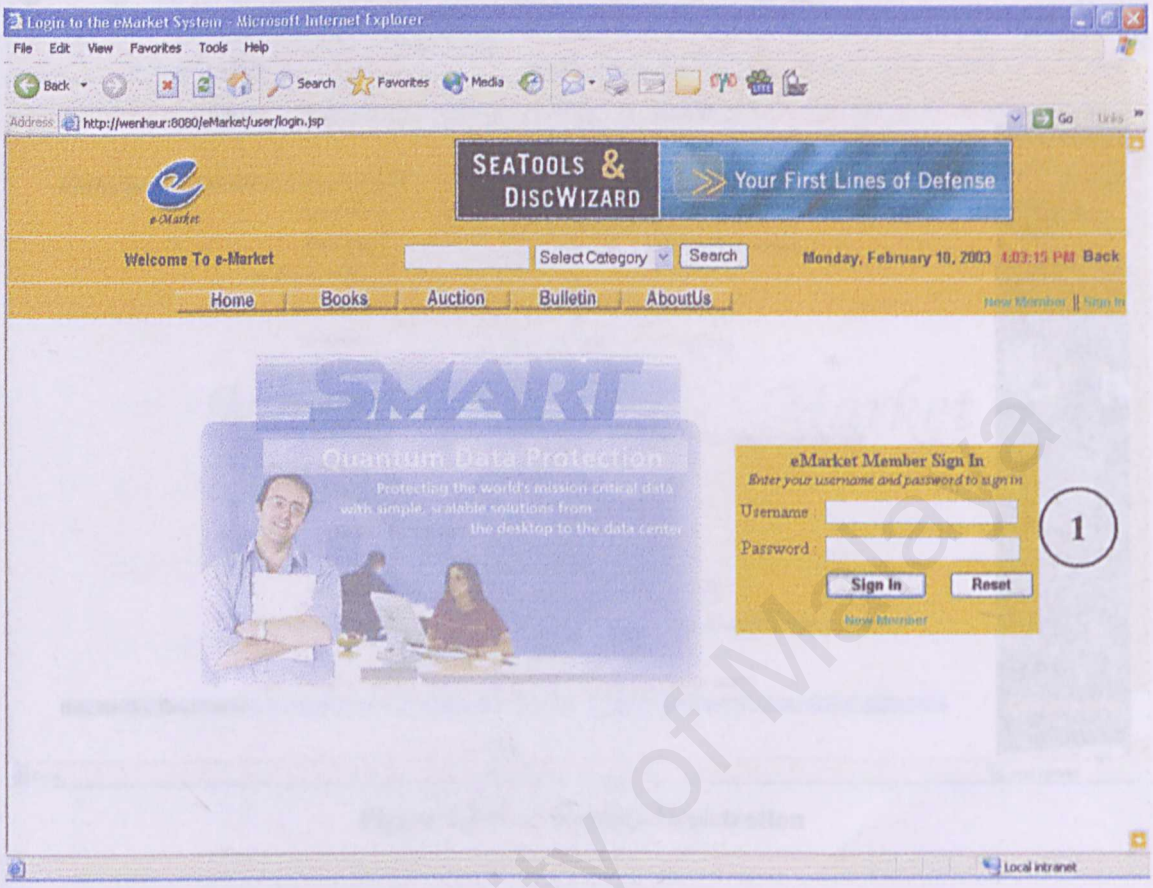


Figure.2 User Login

Descriptions of the Figure 9.2:

1. For those who had already registered with the system, you can just type your username and password [(1) in Figure 9.2] to login to the system.
2. The Username must be the valid characters which include A-Z, a-z, 0-9, space, _, -, : and ().
3. The Password must be the valid characters and consist of minimum 6 characters.

New Member

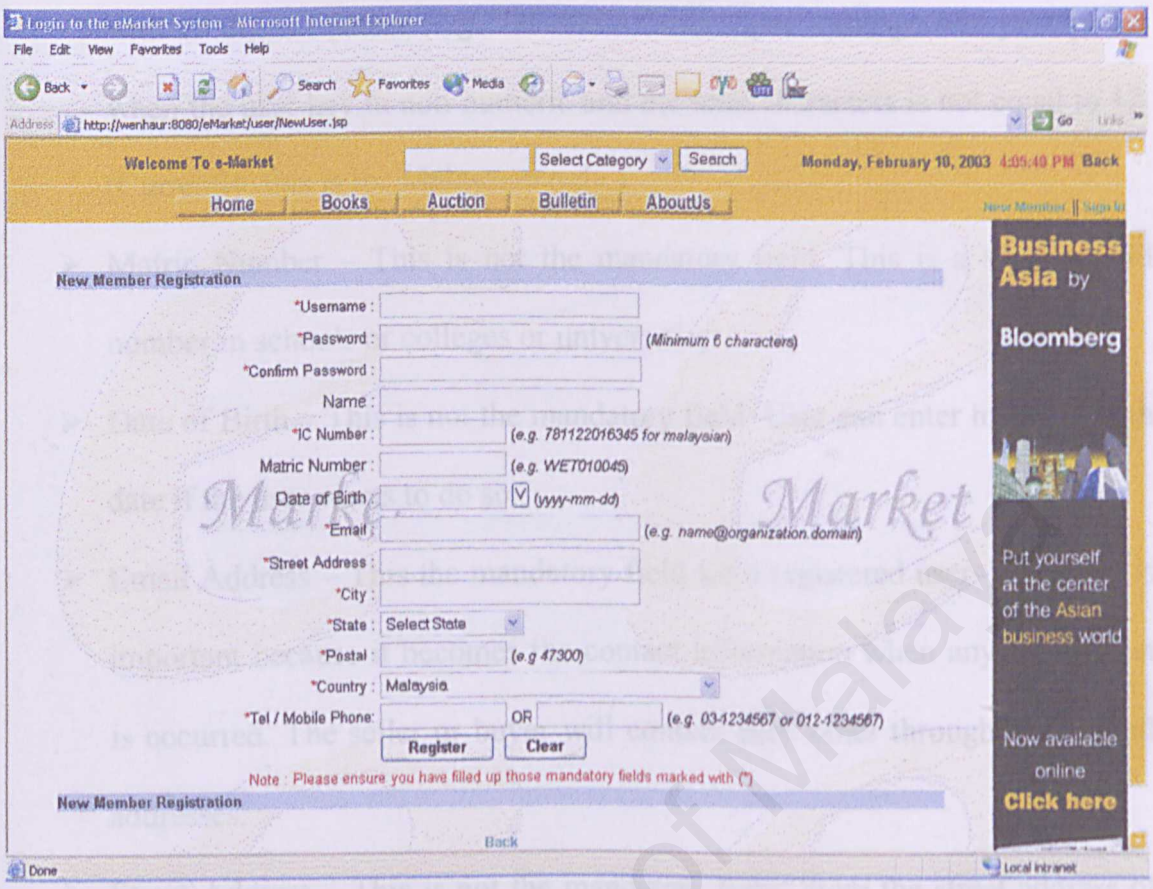


Figure 9.3 New Member Registration

Descriptions of the Figure 9.3:

1. For new user, you can register with the system by filling the registration form which is shown in Figure 9.3.

- Username – This will be the login ID for you to login to the system. Username must be the valid characters. It's a mandatory field. If the username that you entered exist in our database, you have to change it, or you will not be able to register with the system.
- Password – Key in the password with minimum 6 characters which must be the valid characters. Please remember your password properly because the system will not retrieve the password for you. It's a mandatory field.
- Name – This is not the mandatory field. This field indicates the full name of the user.

- IC Number – Key in the correct IC Number. New IC is required for this field with 12 digits number (e.g. 790208015544). Error message will prompt out when the user key in non-numeric and the total characters is not equal to 12. (Currently, this is for Malaysian only.)
- Matric Number – This is not the mandatory field. This is a student card number in schools or colleges or universities.
- Date of Birth – This is not the mandatory field. User can enter his / her birth date if the user wants to do so.
- Email Address – This the mandatory field for a registered user. This field is important because it becomes the contact information when any transaction is occurred. The seller or buyer will contact each other through their email addresses.
- Street Address – This is not the mandatory field. Store the street address of the users.
- City – This is not the mandatory field. Store the city information of the users.
- State – This is not the mandatory field. Store the state information of the users.
- Postal – This is not the mandatory field. Store the postal information of the user. This field only accepts 5 digits numbers.
- Country – This is not the mandatory field. Store the country information of the users.
- Tel / Mobile Phone – The users are required to fill in at least one field. The contact number will be an alternative way used by the system administrator to contact with the users. This is the fastest way and direct method used to communicate with the users.

9.2.3 Unregistered User – Trading Module

Books

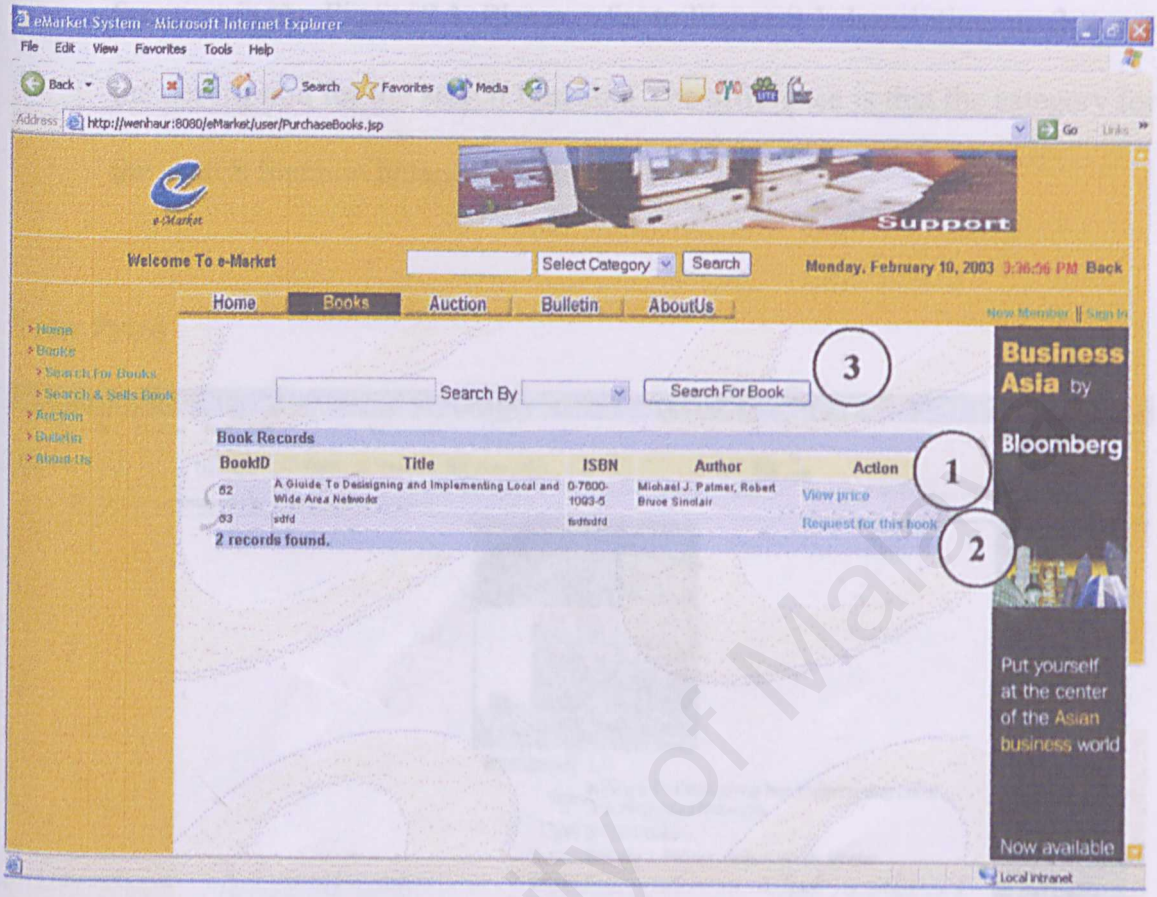


Figure 9.4 Books Record

Descriptions of the Figure 9.4:

1. The books' records in the database will either display in two situations below.

- View Price – This situation occur when the book has stock currently and is available for sale. As show in the Figure 9.5, user is only allowed to view the prices of the book.
- Request for book – This situation occurs when the book recorded has no stock at the moment. The user can request for this book from the system by filling the request form. See Figure 9.6 (This service is for registered user only).

2. The web page also provides the search function for searching the used books. See (3) in the Figure 9.4. This search function is same with the search function in the Figure 9.1. Please refer to Figure 9.1 description no. 2 to see the description for the search function. The difference is that the category for the search function here is only for Book.

View Price

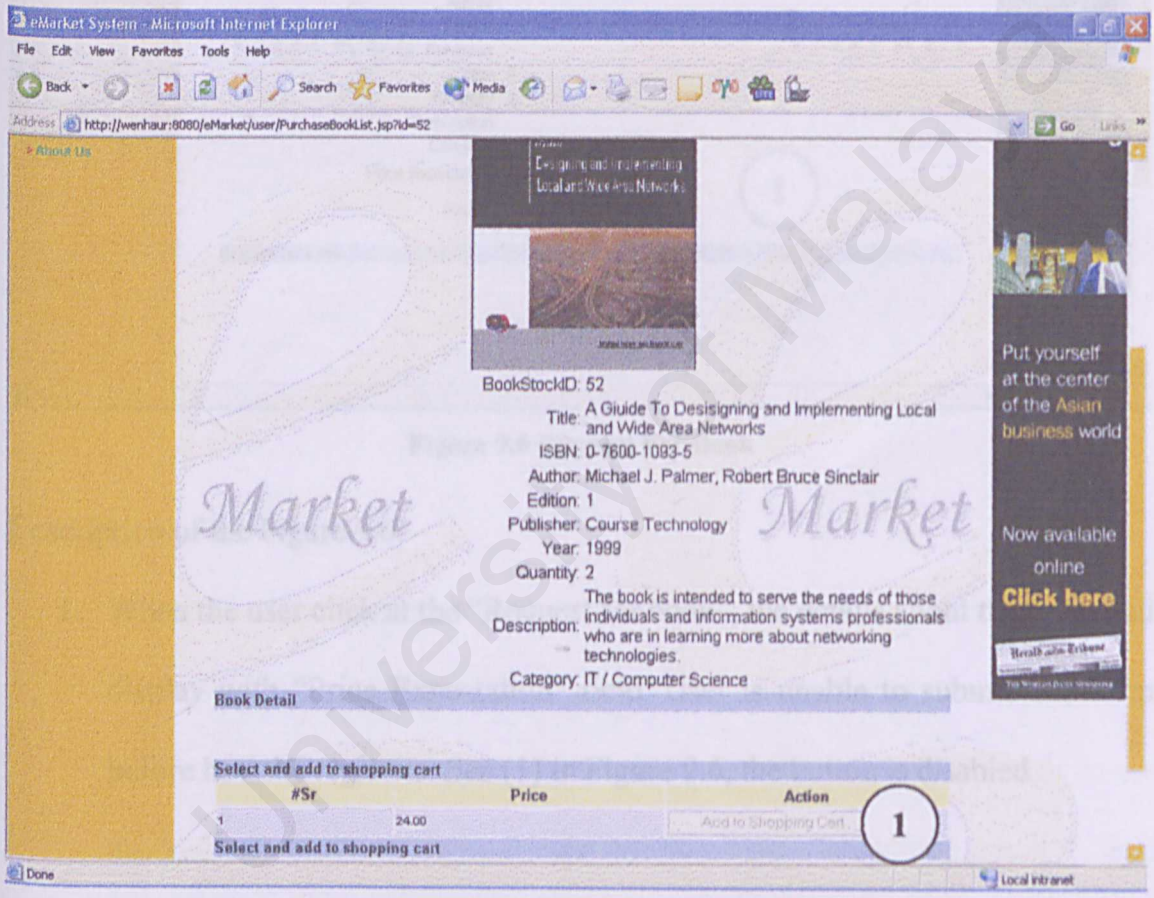


Figure 9.5 View Price & Book Detail

Descriptions of the Figure 9.5:

1. When the user click at the "View Price", the details about the book will display together with the prices. If there is more than one book in the stock, the price of each book will display at the bottom of the page. See (1) in the Figure 9.5. Also, the user is unable to add it to the shopping cart before he/she registers with the system.

Request for book

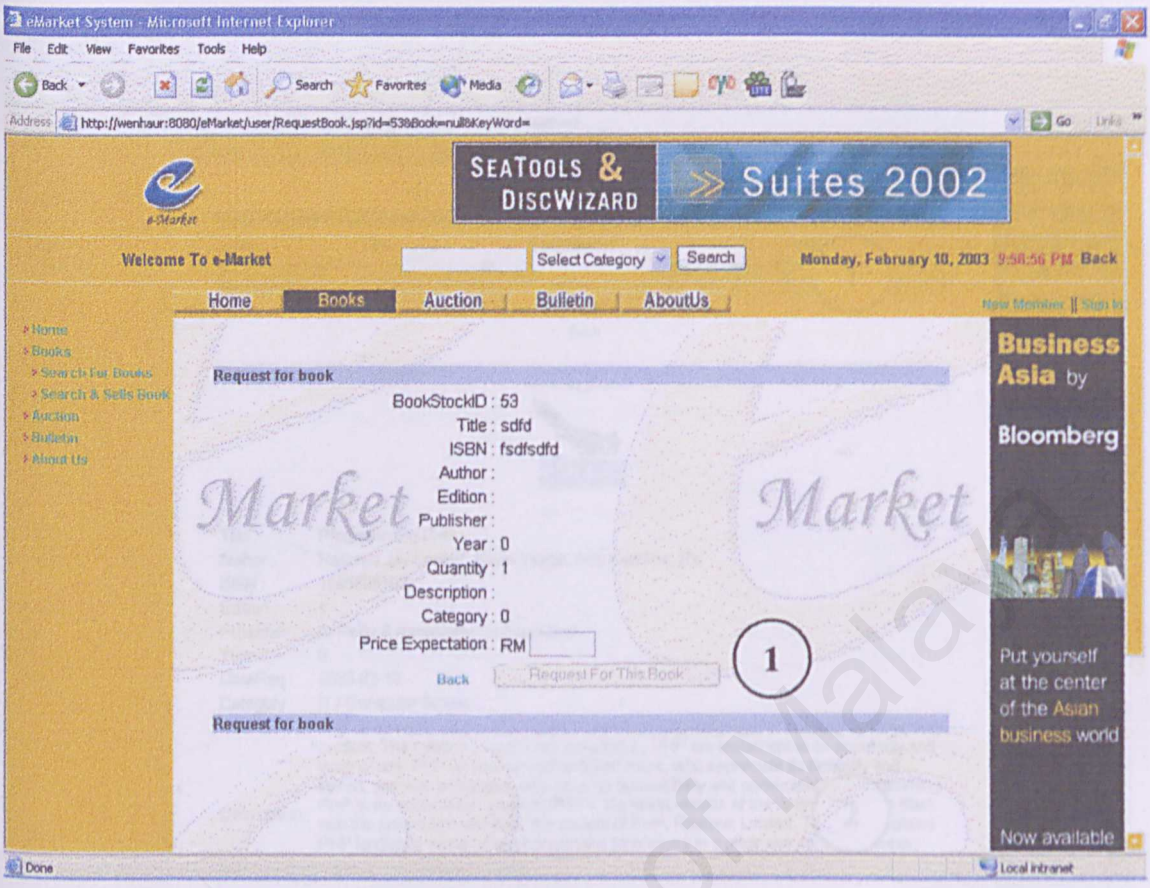


Figure 9.6 Request For Book

Description of the Figure 9.6:

1. When the user click at the "Request for book", the details about the book will display with "Price Expectation" field. User is unable to submit this form before he / she registers. See (1) in Figure 9.6, the button is disabled.

Bulletin

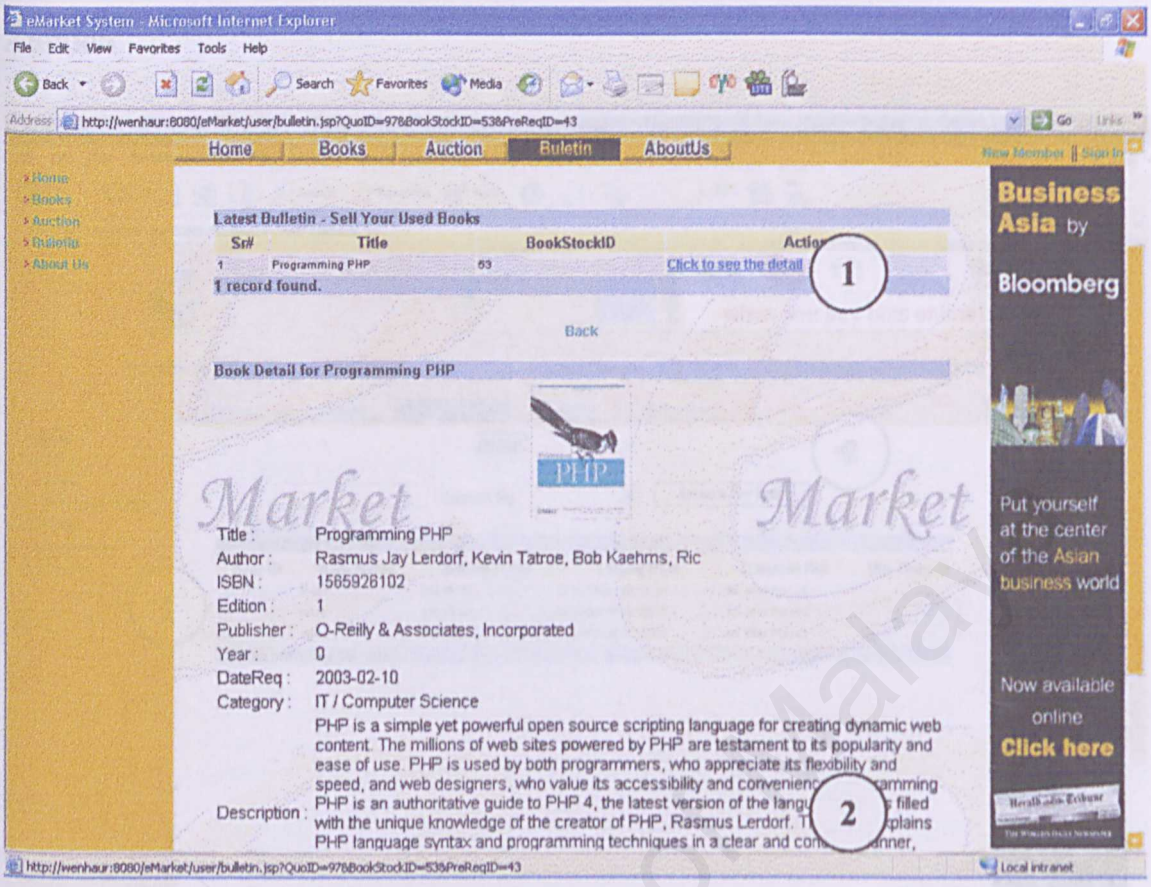


Figure 9.7 Latest Bulletin

Description of the Figure 9.7:

1. This is the latest bulletin that provided by the system to enable users to sell their books to the system. User will see the list of the books that requested by other users. See (1) in the Figure 9.7. You can click at any book title to see the details whether you have the book or not. Unregistered user cannot submit this form. See (2) in the Figure 9.7, the submit button is at the bottom of the (2).

9.2.4 Unregistered User – Auction Module

Auction

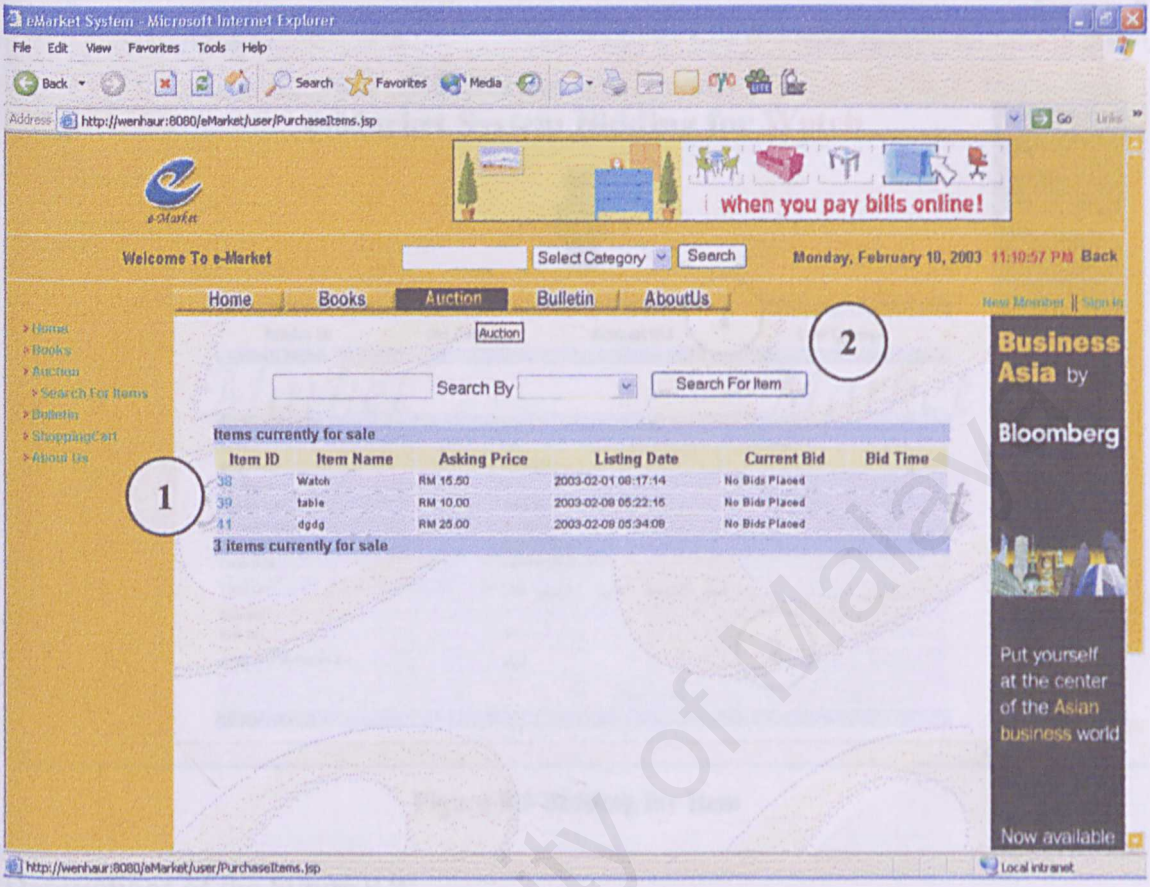


Figure 9.8 Item Record

Descriptions of the Figure 9.8:

1. This page will list out the items that currently for sales. Users are allowed to click at the Item ID for the item details and the bidding information. See (1) in the Figure 9.8.
2. The page also provides the search function for searching the items. See (2) in the Figure 9.8. This search function is same with the search function in the Figure 9.1. The difference is that the category for the search function here is only for Items.

Auction

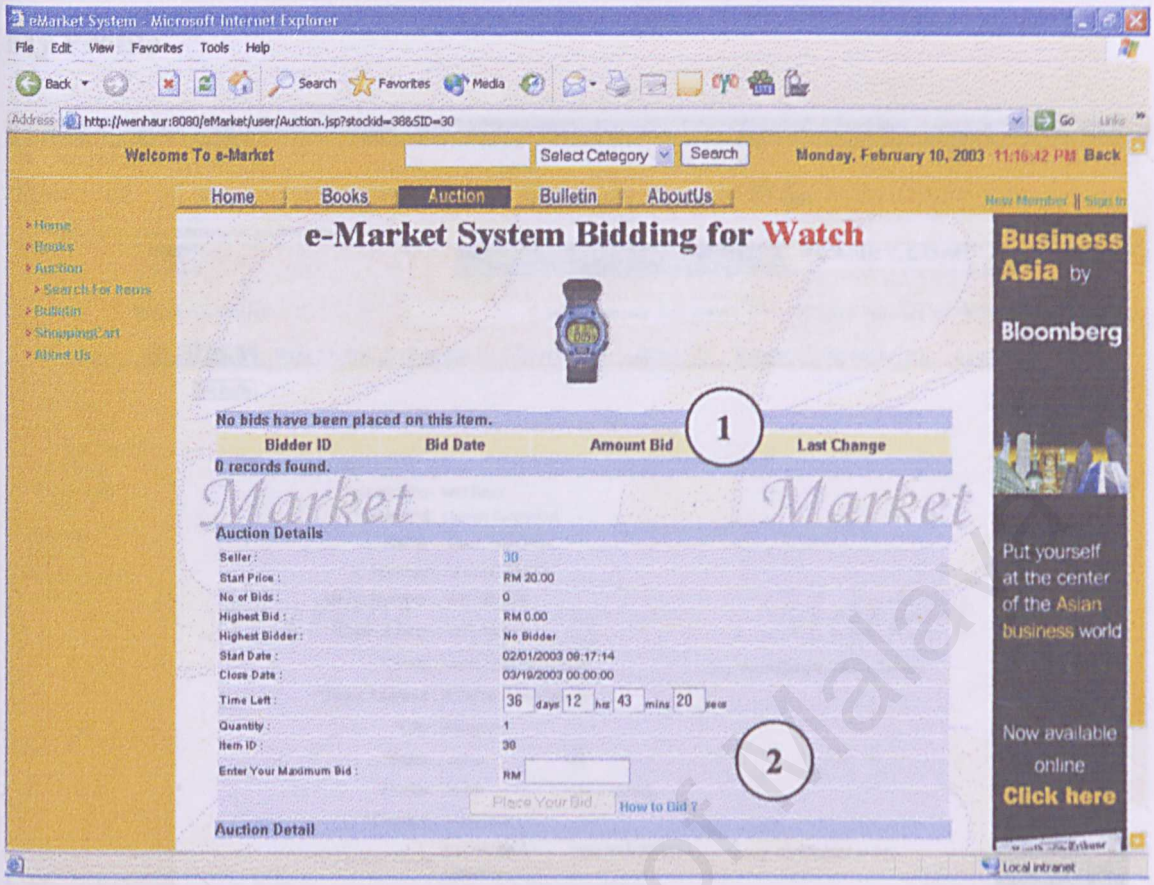


Figure 9.9 Bidding for Item

Descriptions of the Figure 9.9:

1. The bidding information will show the current bid amount and the bidder for the item. See (1) in the Figure 9.9.
2. Below the table of the bidding information, there are the auction details about the item. Only the registered user can place bid on the item. See (2) in Figure 9.9.

9.2.5 Registered User – User Management Module

My Profile

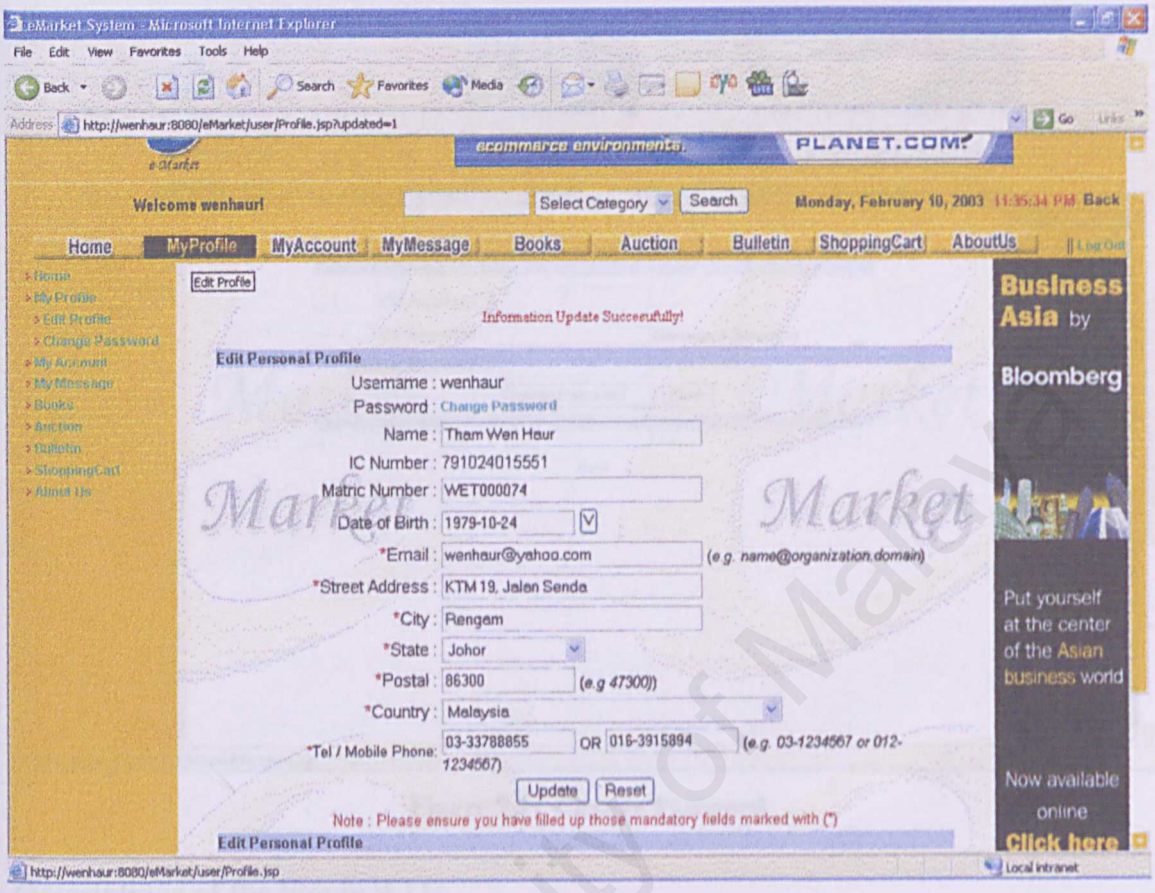


Figure 9.10 Edit Personal Profile

Descriptions of the Figure 9.10:

1. This system provides a service that allows the users to update their personal details and the contact information.
2. Users are allowed to modify any field that is changeable.
3. Users also can change their password by click at the "Change Password".

Change Password

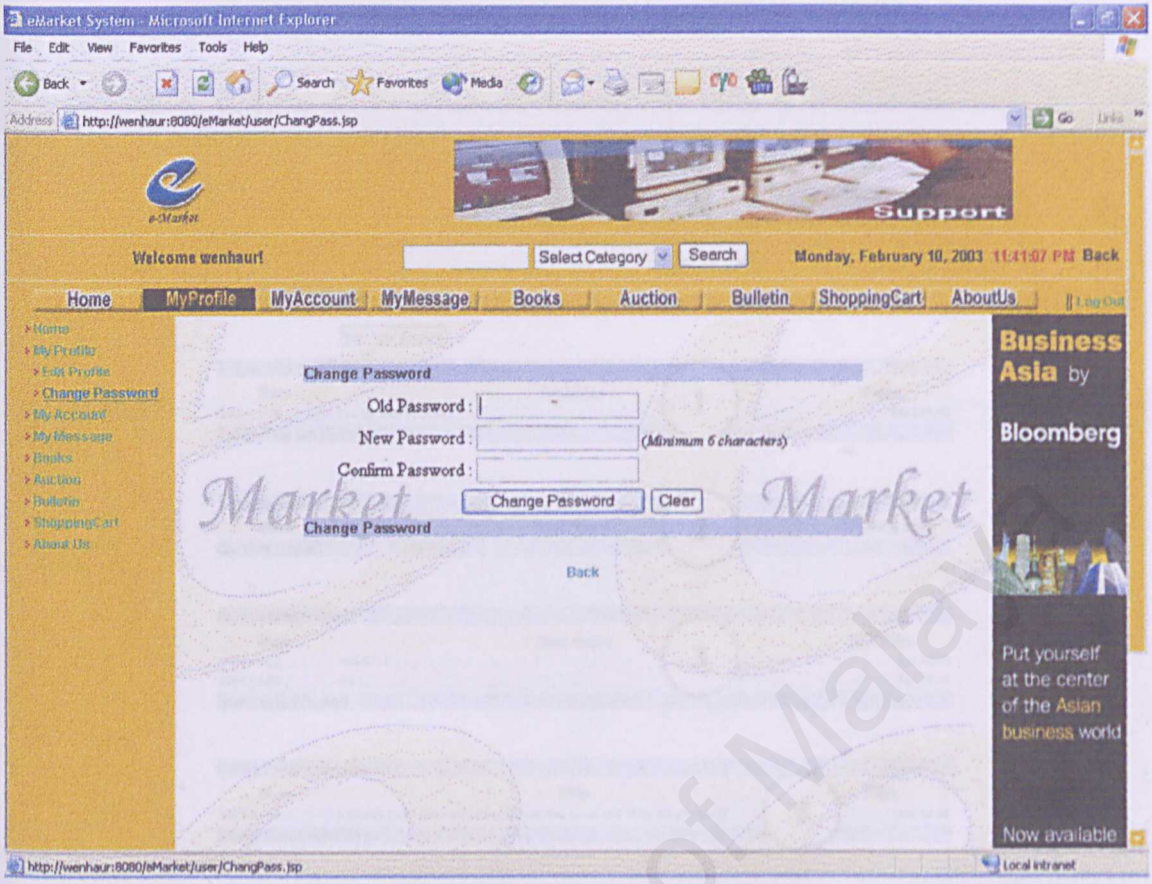


Figure 9.11 Change Password

Descriptions of the Figure 9.11:

1. This system provides a service that allows users to change their login password.
2. Users can change password by key in the old password and key in the new password and then confirm password with minimum 6 characters. The field is not accepting invalid characters.

My Account

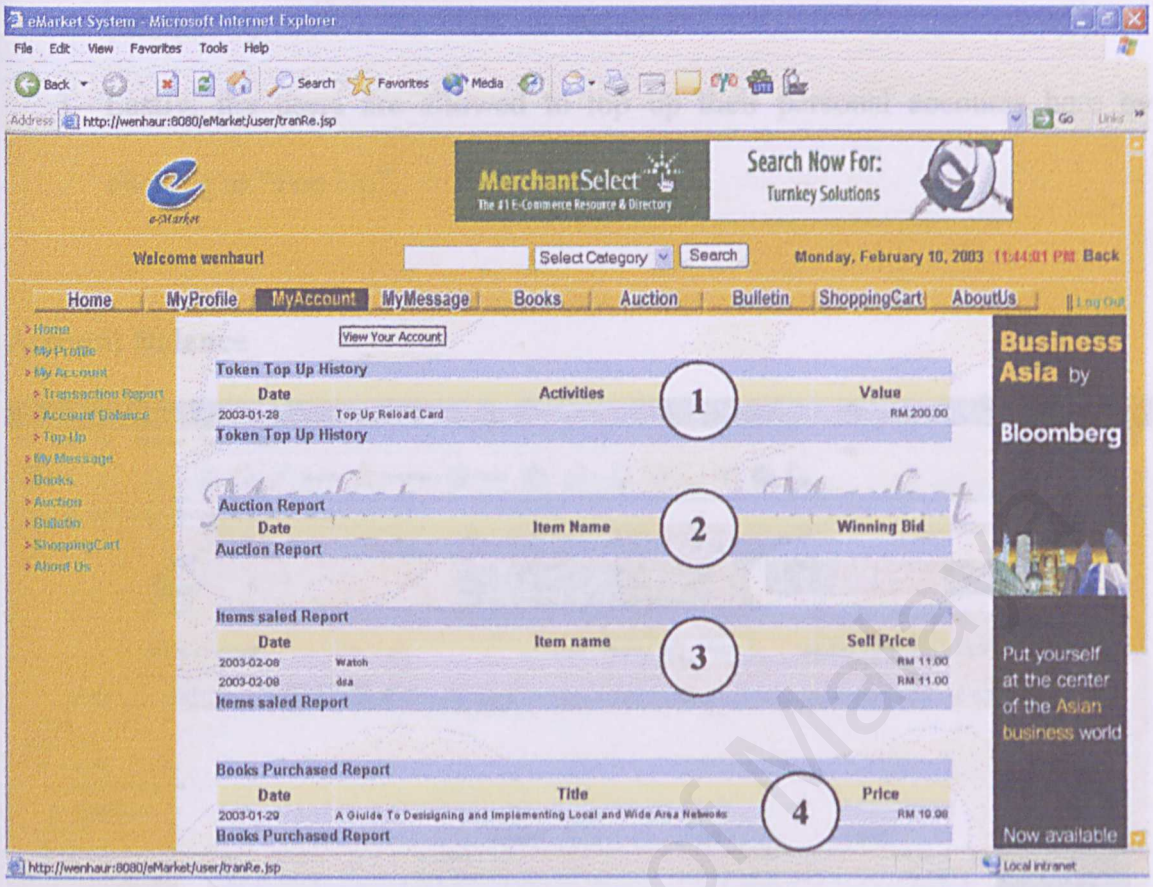


Figure 9.12 Transaction Report

Descriptions of the Figure 9.12:

1. This is the transaction report that records all the transactions occurred between the user and the system.

- The 1st table shows the Token Top Up history for the user. Every time the user top up the account, it will record into this table.
- The 2nd table shows the auction report. This report will record the successfully bidding on an item.
- The 3rd table shows the Items Sale Report. This report will record the successfully sale items for a user.
- The 4th table shows the Books Purchased Record. This report will record the books that had been bought by the user.

2. Besides the transaction report, the users also can check their account balances by click at the "Account Balance".
3. Lastly, the users are allowed to top up their personal accounts here by clicking at "Top Up".

Account Balance

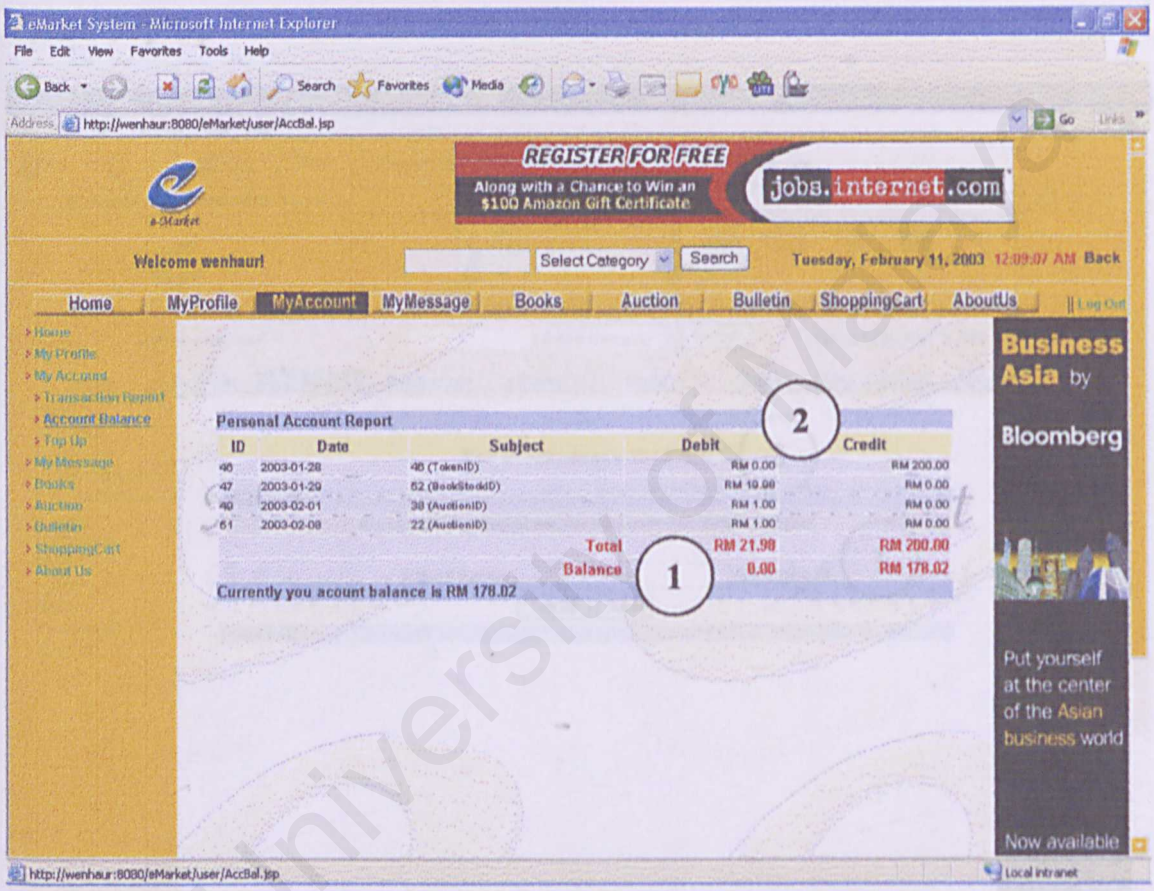


Figure 9.13 Check for Account Records & Account Balance

Descriptions of the Figure 9.13:

1. Users can easily check their account balances here. Besides that, users can view the account details that record all the transactions between user and the system.
2. User will have the positive balance when Balance [(1) in figure 9.13] on the Credit [(2) in figure 9.13] side is greater than the Debit side.
3. The system will displayed 3 possible IDs in the Subject column.

- TokenID – This refers to the reload card ID.
- AuctionID – This refers to the item ID that posted by the user for sale (Auction module).
- BookStockID – This refers to the books that the user bought from the system.

Token Top Up

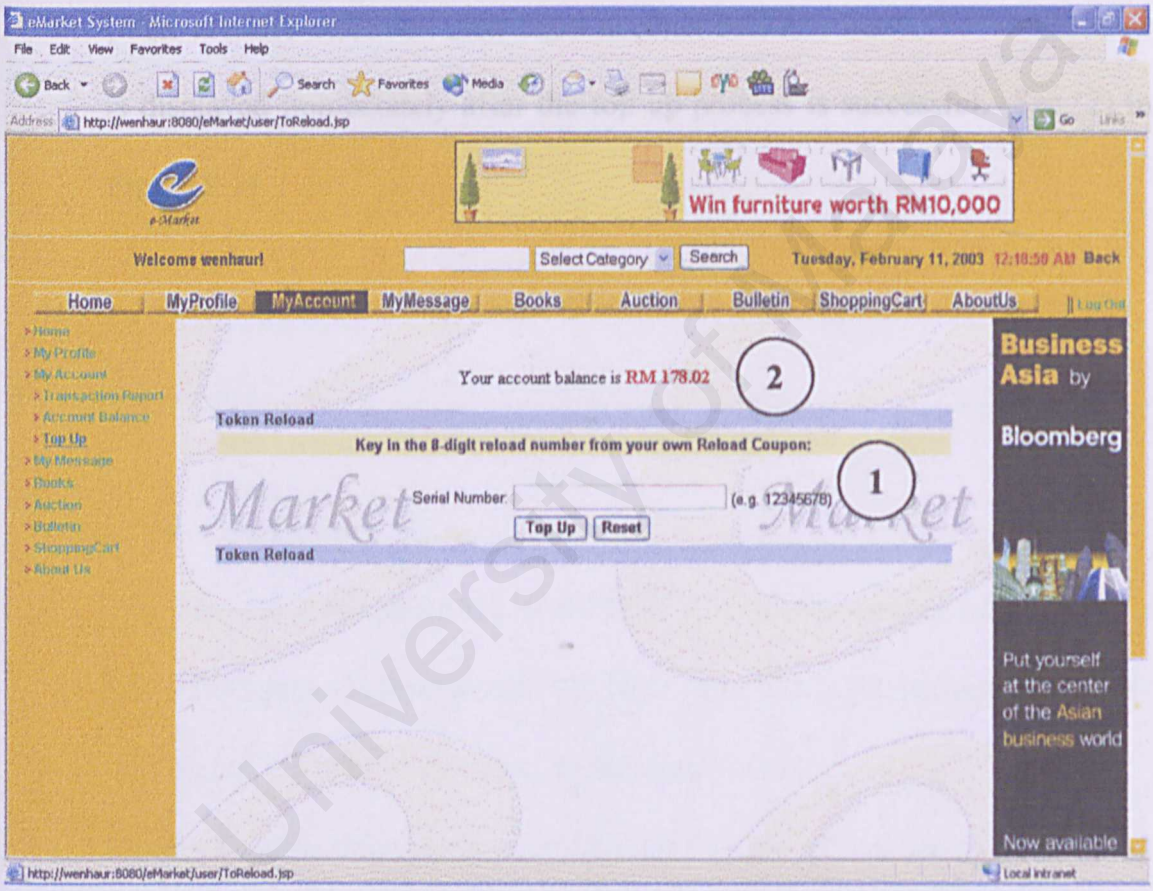


Figure 9.14 Token Top Up

Descriptions of the Figure 9.14:

1. Users can easily top up their accounts here. Users are needed to enter the 8 digits number in the reload card. See (1) in Figure 9.14.
2. Before you can top up, you must buy the reload card from any shop that sells the reload card. There are varying of prices of the reload card in the market, RM 10, RM 20, RM 50 and RM 100.

3. The Token Top Up process will produce three possible messages.

- If the top up process is success, the system will displayed "Top up successfully!".
- If the serial number entered is in used, the system will displayed "The card is already in used.".
- If the serial number is invalid, the system will displayed "The serial number entered not match! Please re-enter.".

4. Users are also can view their latest account balances here. The new balance is displayed immediately after the top up process is successful. See (2) in Figure 9.14.

My Messages

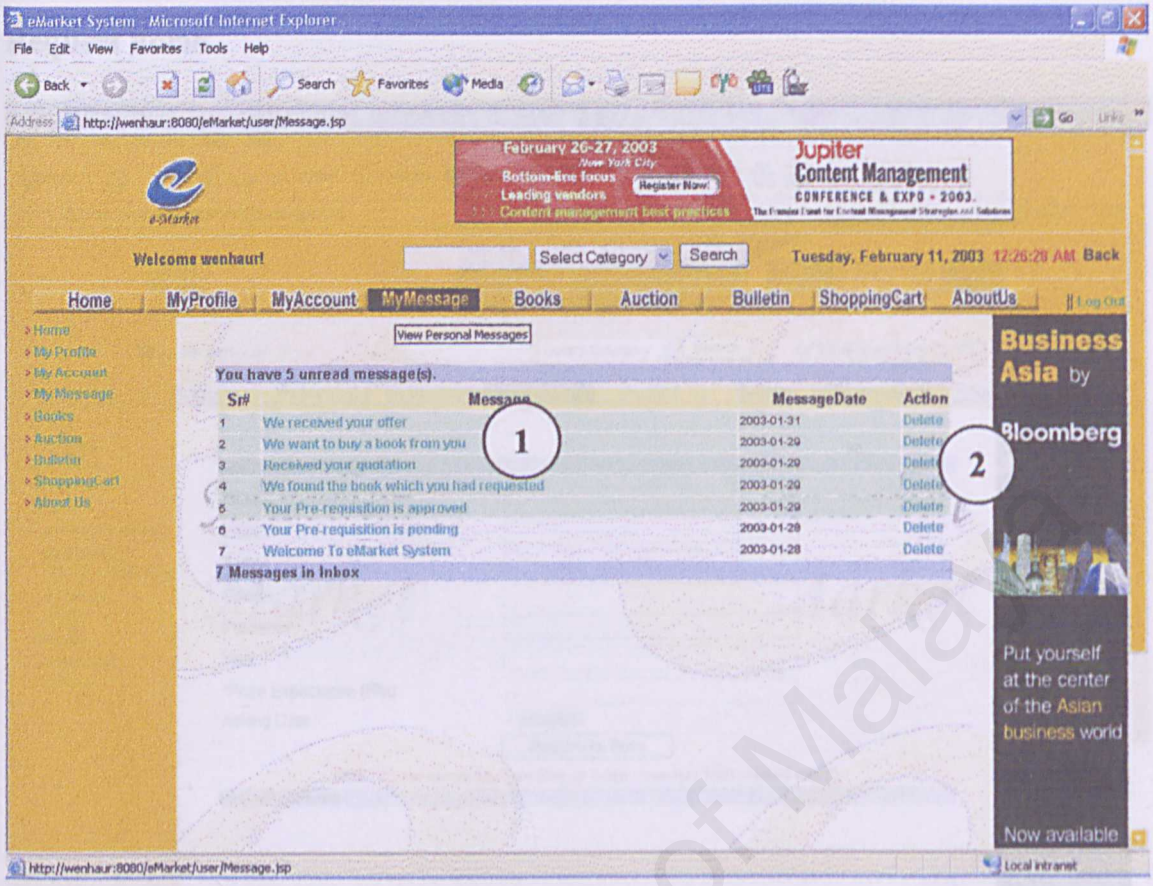


Figure 9.15 Personal Messages

Descriptions of the Figure 9.15:

1. The Blue color line at the top of the table will tell the users about the total of unread messages in their inbox. The Blue color line at the bottom of the table will record the total of messages in the users' inbox.
2. Users can view their messages by clicking at the title of the messages. See (1) in Figure 9.15.
3. To delete the message, users need to delete it one by one. Users can delete the message from the main page, (2) in the Figure 9.15 or delete it while reading the message (in the other page).
4. The unread messages will be mark with the LimeGreen color and the read messages will be mark with the LightBlue color.

9.2.6 Registered User – Trading Module

Request Form

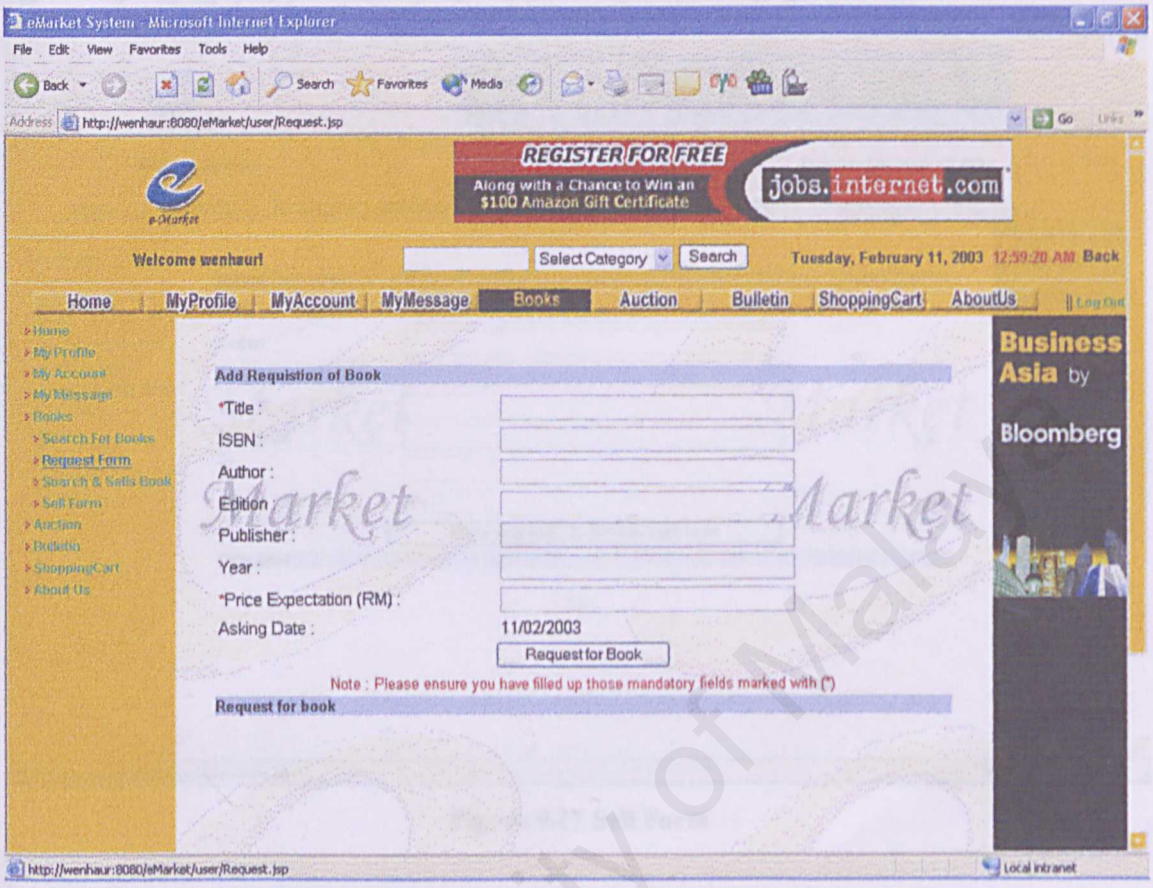


Figure 9.16 Request Form

Descriptions of the Figure 9.16:

1. Users can use this request form when they cannot find the book they need in our database.

- Title – Title of the book. It's a mandatory field.
- ISBN – ISBN of the book.
- Author – Author of the book.
- Edition – Edition of the book.
- Publisher – Publisher of the book.
- Year – Publisher's Year of the book.
- Price Expectation – Price Expectation to the book. It's a mandatory field.

Sell Form

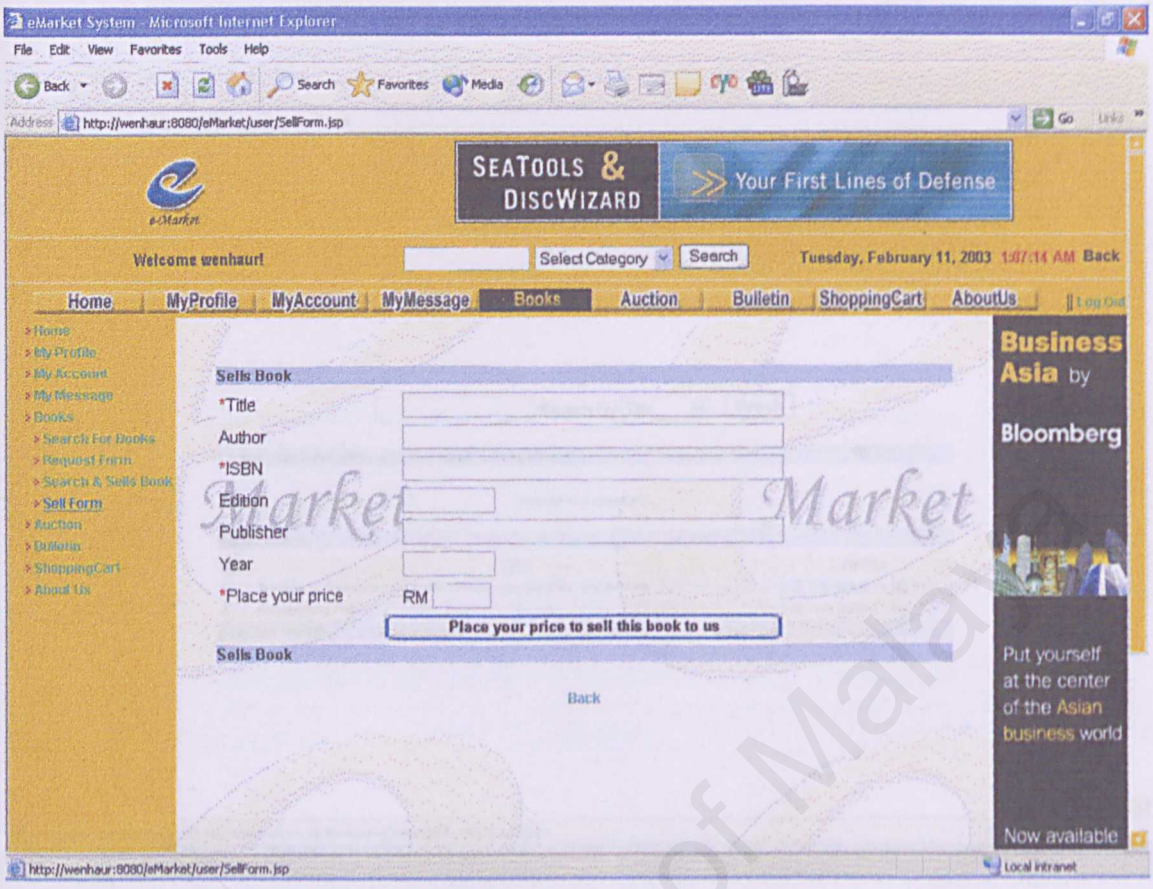


Figure 9.17 Sell Form

Descriptions of the Figure 9.17:

1. Users can use this sell form when they cannot find the book in our database.

- Title – Title of the book. It's a mandatory field.
- Author – Author of the book.
- ISBN – ISBN of the book. It's a mandatory field.
- Edition – Edition of the book.
- Publisher – Publisher of the book.
- Year – Publisher's Year of the book.
- Place Your Price – Place Your Price to the book. It's a mandatory field.

Search and Sell Books

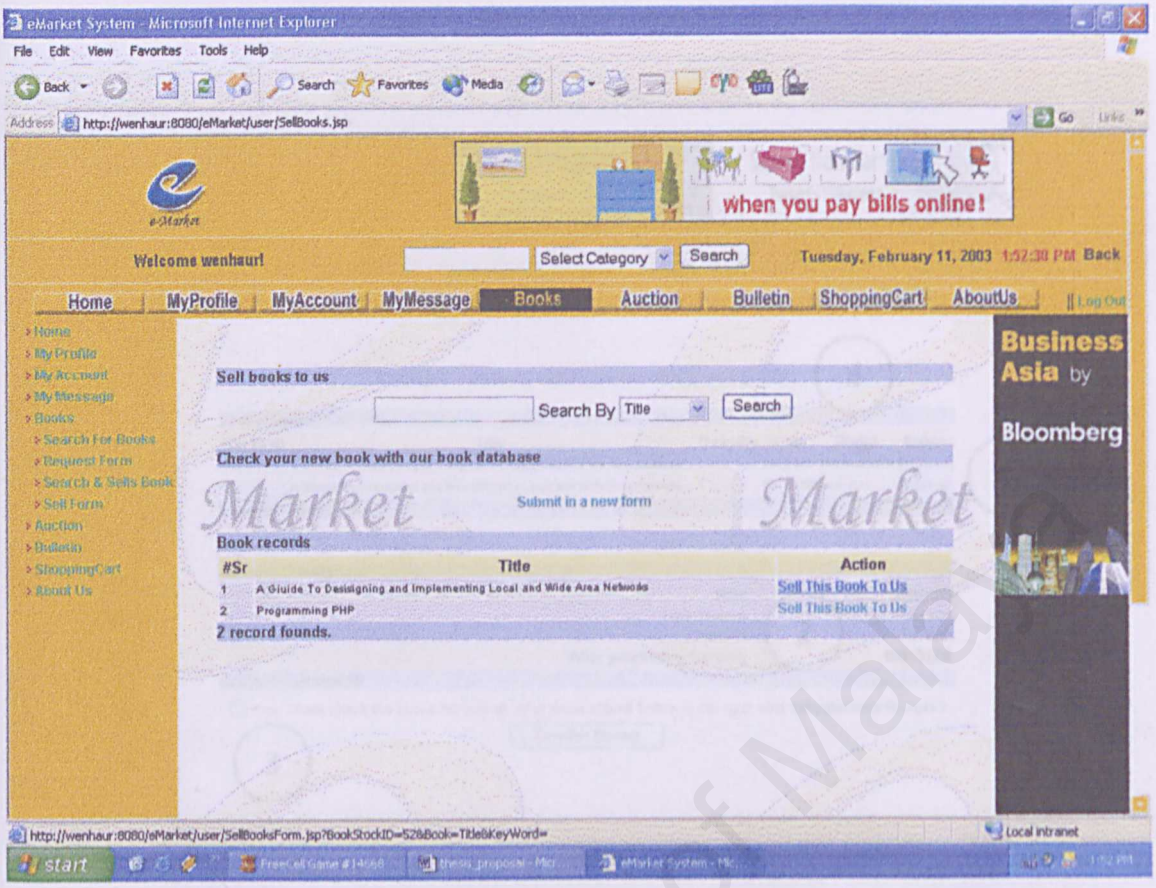


Figure 9.18 Search and Sell

Description of the Figure 9.18:

1. Besides using the sell form as shows in the Figure 9.17, users can also search and sell books in the system. Firstly, they should search for the book. If the users found the book, then they can sell the book directly by filling the price of the book.

Add Books into Shopping Cart

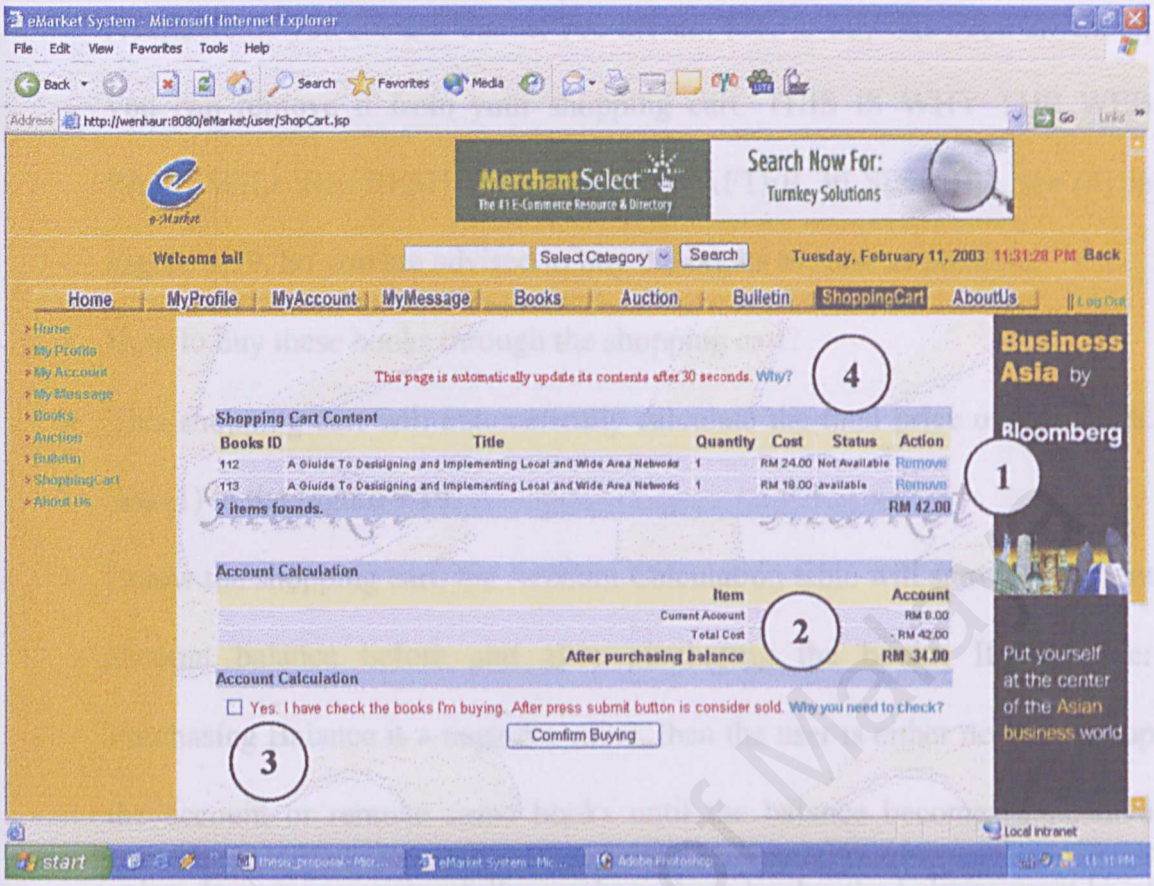


Figure 9.19 Shopping Cart

Descriptions of the Figure 9.19:

1. Virtual Business Center Subsystem provides shopping cart feature that allows users to add any selected used book to a temporary basket. Users are allowed to add more books to it or remove any books from it. See (1) in Figure 9.19.
2. Users should take note here. The principle in using this system is "First Come First Serve". Even though you have added a certain book into your shopping cart, you may not be successfully to purchase it. Other users also can select the same book to add it into their shopping cart. So the Status in the shopping cart will displayed two possible statuses, Available and Not Available.

3. When this book had been bought by other user, the status will displayed Not Available. If you see this status, you are not able to buy this book anymore; you can remove it from your shopping cart. THIS IS WHY THE WEB PAGE WILL REFRESH ITS CONTENT AFTER 30 SECOND, see (4) in Figure 9.19. So you are advised to buy the books as soon as possible.
4. How to buy these books through the shopping cart?

- This shopping cart will automatically calculate the total price of the books. See (1) in the Figure 9.19.
- Below the shopping cart, the Account Calculation table will show the current account balance before and after purchasing the books. If the After Purchasing Balance is a negative value, then the user is either need to top up the account or remove some books until the balance becomes a positive value. In order to successfully purchase these books, the balance must be at least RM 0.00 [(2) in Figure 9.19].
- Before clicking at the Confirm Buying Button, the user needs to understand that after clicking at the button, the book is considered sold if the transaction is successful. So the user must check the check box before proceeding, see (3) in Figure 9.19.
- After clicking the button, the system will show the status of the purchasing whether Transaction Successfully or Transaction Not Successfully. See (1) in Figure 9.20

Status of Purchasing Books

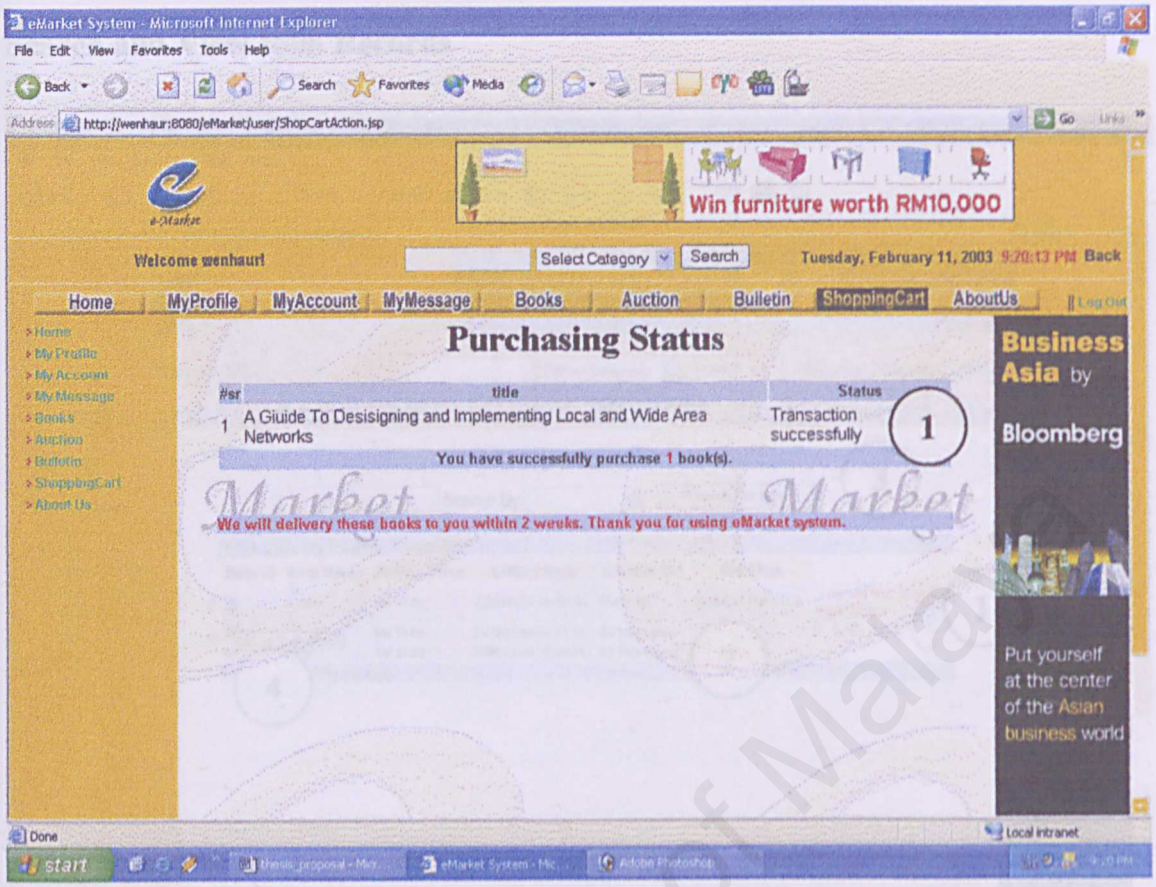


Figure 9.20 Status of Purchasing Books

9.2.7 Registered User – Auction Module

Search and View Item Records

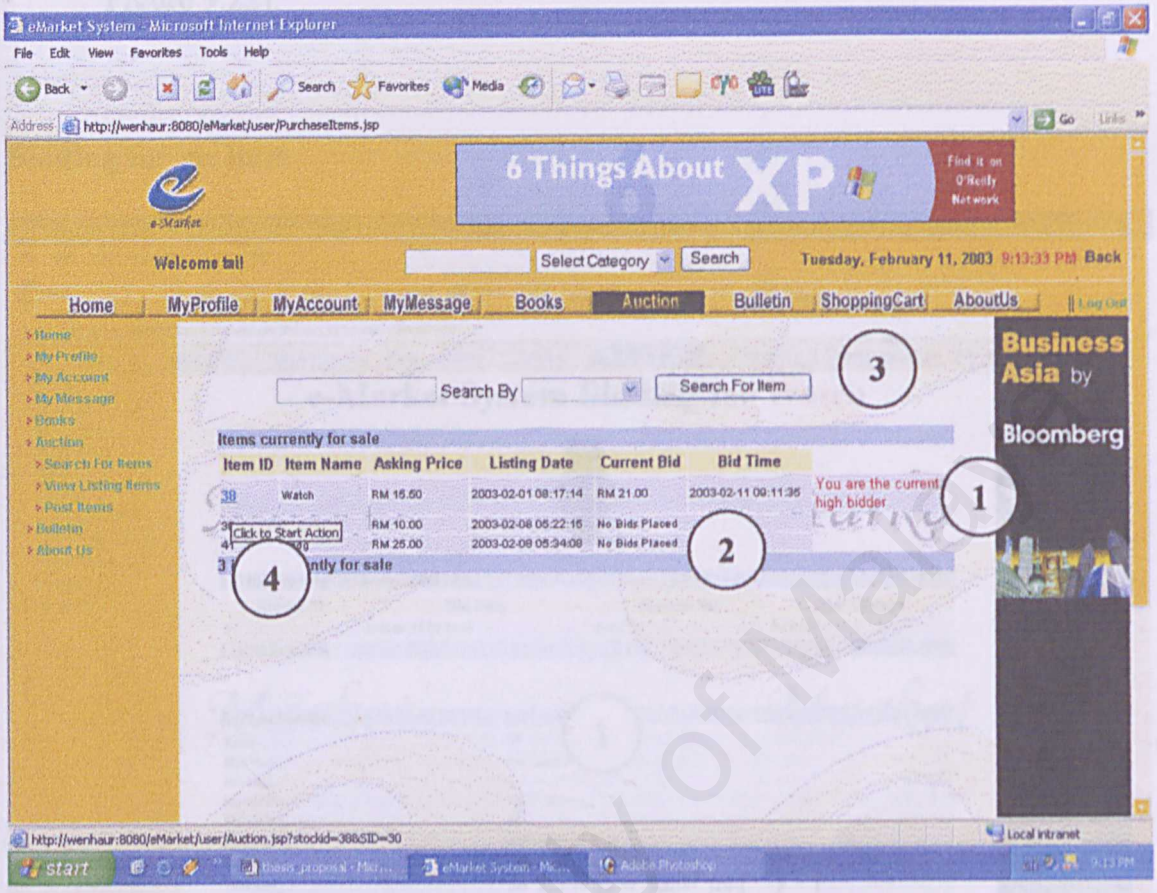


Figure 9.21 Search and View Item Record

Descriptions of the Figure 9.21:

1. Users are allowed to search [(3) in Figure 9.21] and view all the posted items in the database. The records are displayed based on the expiration date of an item. If the expiration date of an item had already past, then the item will not be displayed in the list.
2. The users are not allowed to place bid on their own item.
3. The system will automatically determine the highest bidder for an item if the user has placed the highest bid on an item [(1) in Figure 9.21].
4. The system will also determine whether the item had been placed a bid by other users or not, [(2) in Figure 9.21]. If not, then the "No Bid Placed" will display, else will displayed the current bid and the bidding time.

5. If users are interest on any item, then they can click at the ID [(4) in Figures 9.21] of the item to enter to auction center and place a bid on the item [see in Figure 9.22].

Bidding for an Item

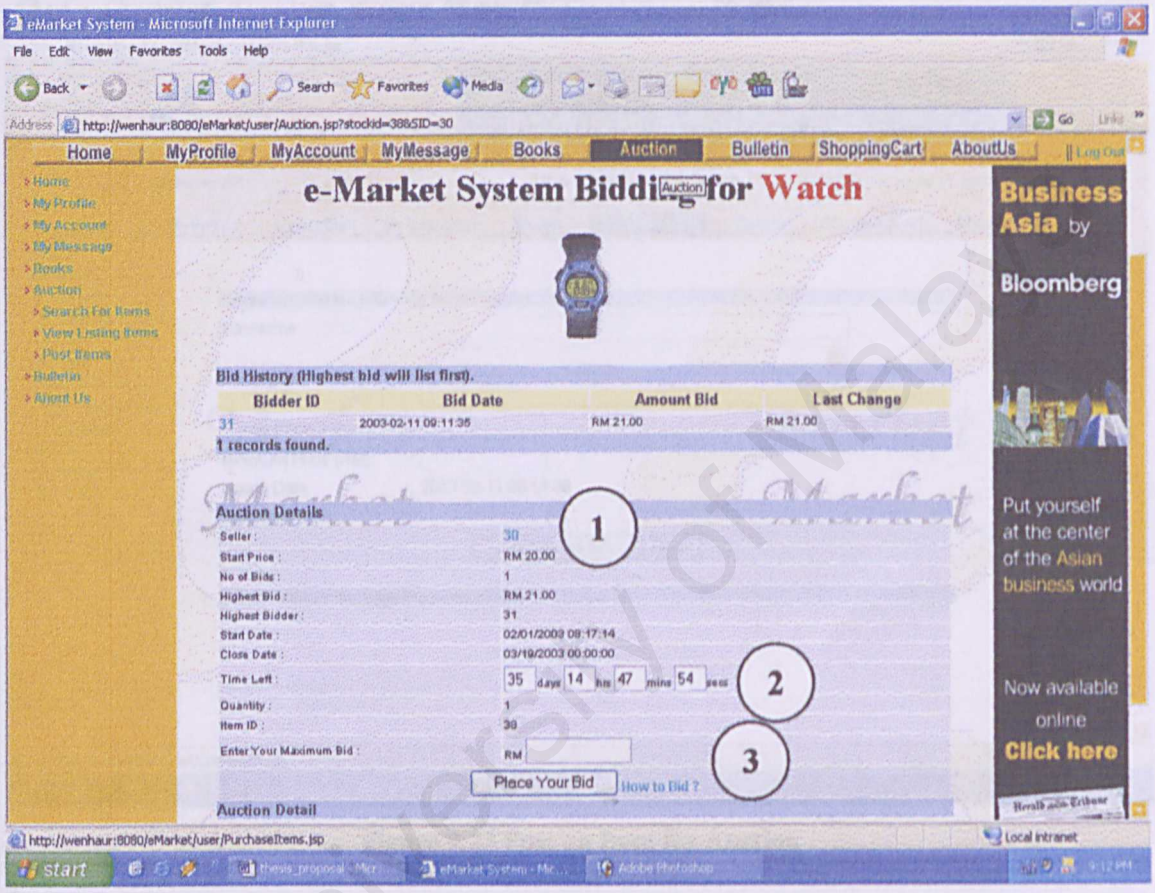


Figure 9.22 Bidding for an Item

Descriptions of the Figure 9.22:

1. For example a user is bidding on the Watch.
2. Please refer to Figure 9.9 for description of 1st table about the bidder.
3. User can view the seller information by clicking at the seller ID at the 2nd table [(1) in Figure 9.22].
4. The page will show the dynamic remaining date and time for this item to be bidded.

5. Lastly, the user can place the bid on this item. The bid must more than the previous bid or the minimum price for the item.

Post an Item

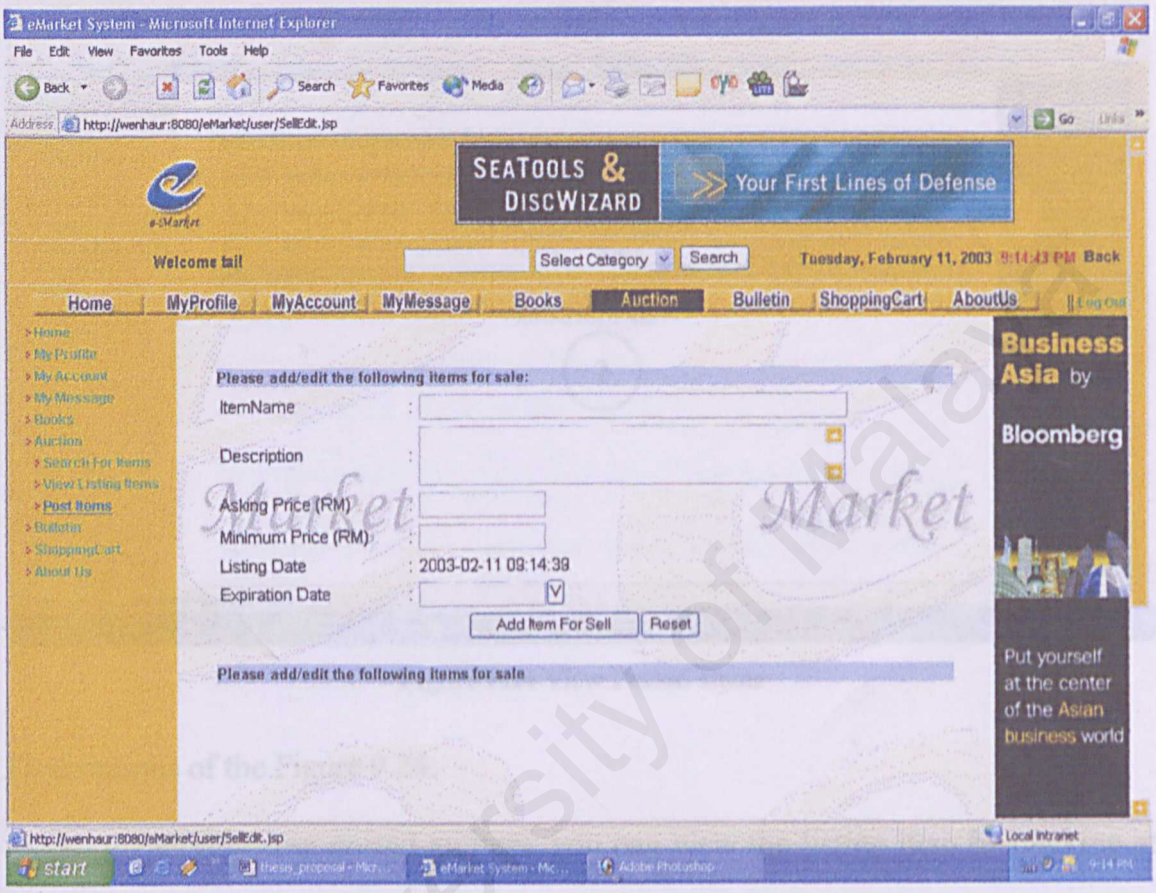


Figure 9.23 Post an Item for Auction

Descriptions of the Figure 9.23:

1. User can post an item for sale through the form shown in Figure 9.23
2. We will charge a small service charge of RM 1.00 each time the user wants to post an item for sale. So the user's account must have at least RM 1.00 each time he / she posts an item.
3. You have to key in the entire fields for a new item for sale. After you have completed the form, please make sure you really want to post this item for sale. This is because a posted item is not allowed to be deleted until the item is sold.

View Posted Items

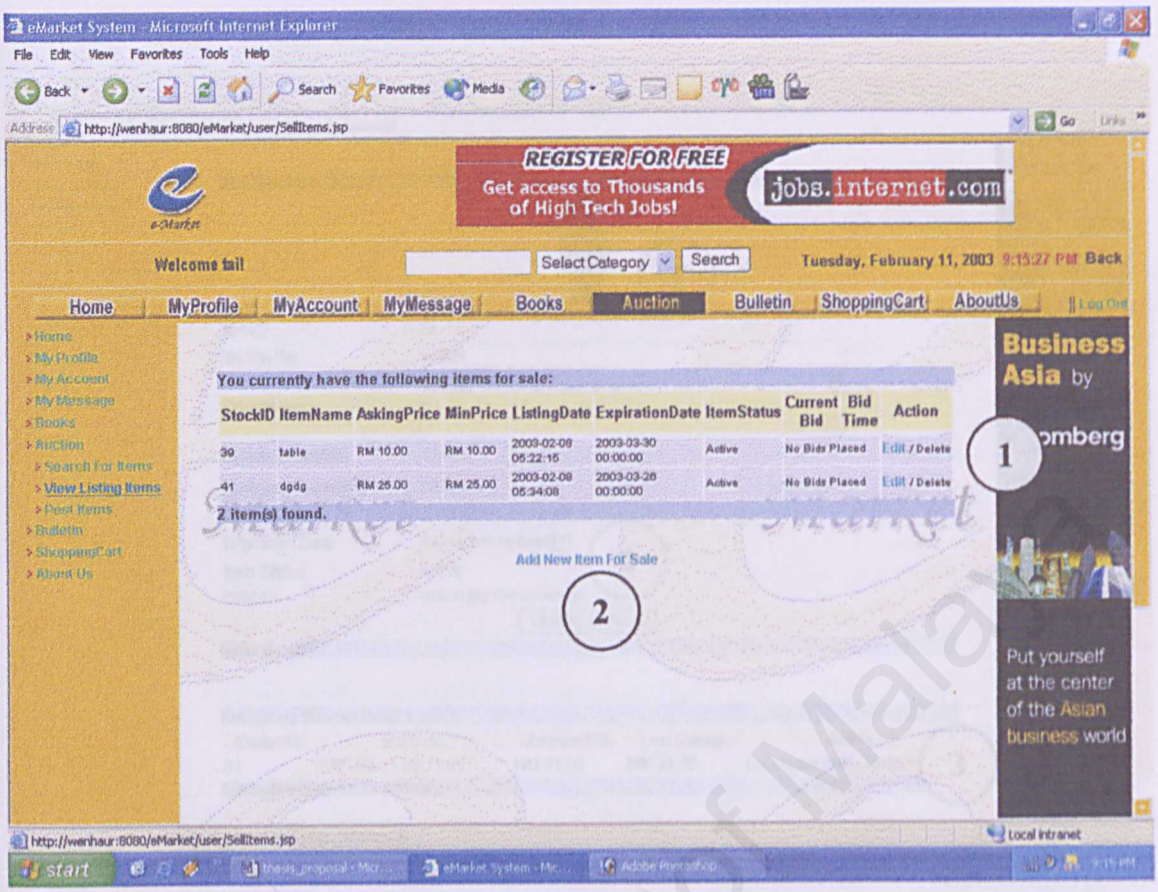


Figure 9.24 View Posted Items

Descriptions of the Figure 9.24:

1. After you have posted an item, you can view the listing item by clicking at the "View Listing Items".
2. You can update [(1) in Figure 9.24] the details of the items by clicking at the "Edit" at the Action column.
3. You also can post a new item by clicking at the "Add New Item for Sale" [(2) in Figures 9.24].

Edit Posted Item

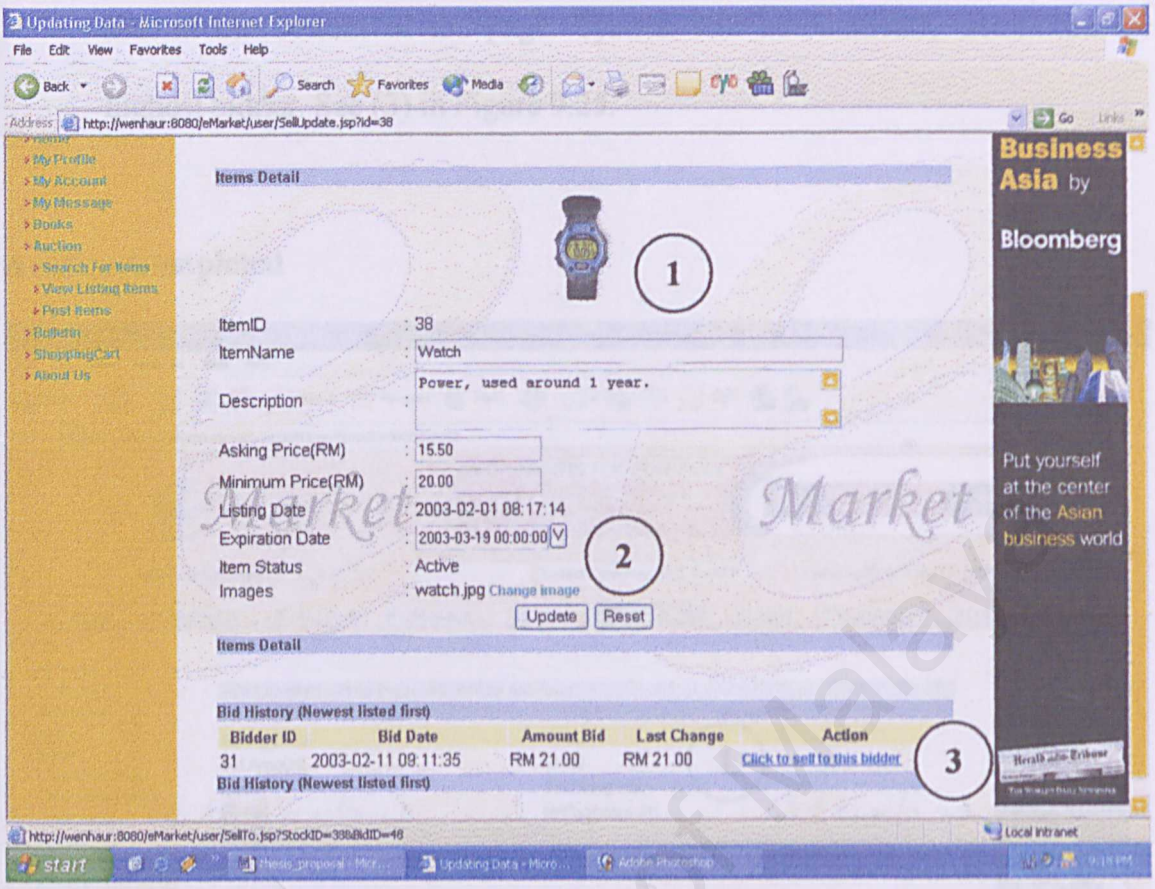


Figure 9.25 Edit Posted Item and Sell Posted Item

Descriptions of the Figure 9.25:

1. The Edit page will have 2 type of status. There are "Active" and "Pending and Sold".
2. The main difference from these 2 types of status is that when the item is in status "Active", it is updatable. The seller is allowed to update it. But when the item is either in status "Pending" or "Sold", the item is not updatable.
3. Seller can update the item for those changeable fields. The update function includes the image upload for this item. The image will display [(1) in Figure 9.25] when the seller successfully upload it. Seller also can change the image by clicking at the "Change Image", see (2) in Figure 9.25.

4. Seller also can sell this item to the highest bidder by clicking at Action of the link at the bottom of the page. System will automatically determine the highest bidder. See (3) in Figure 9.25.

Auction Completed

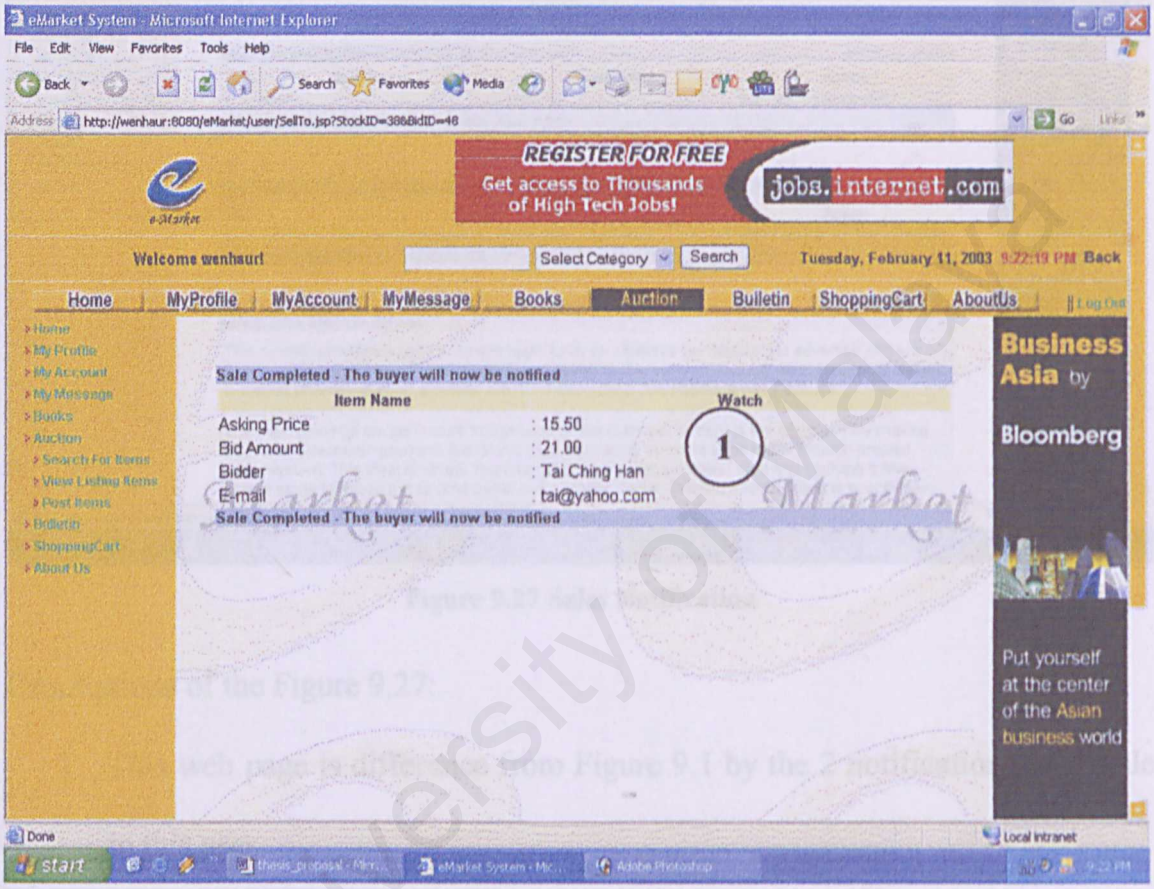


Figure 9.26 Auction Completed

Descriptions of the Figure 9.26:

1. When the user click at the "Click to sell to this bidder", (1) in Figure 9.26 will display the bidding information and the bidder contact information.
2. Seller needs to wait the acceptance from the buyer before this selling transaction is completed.

Sales Notification

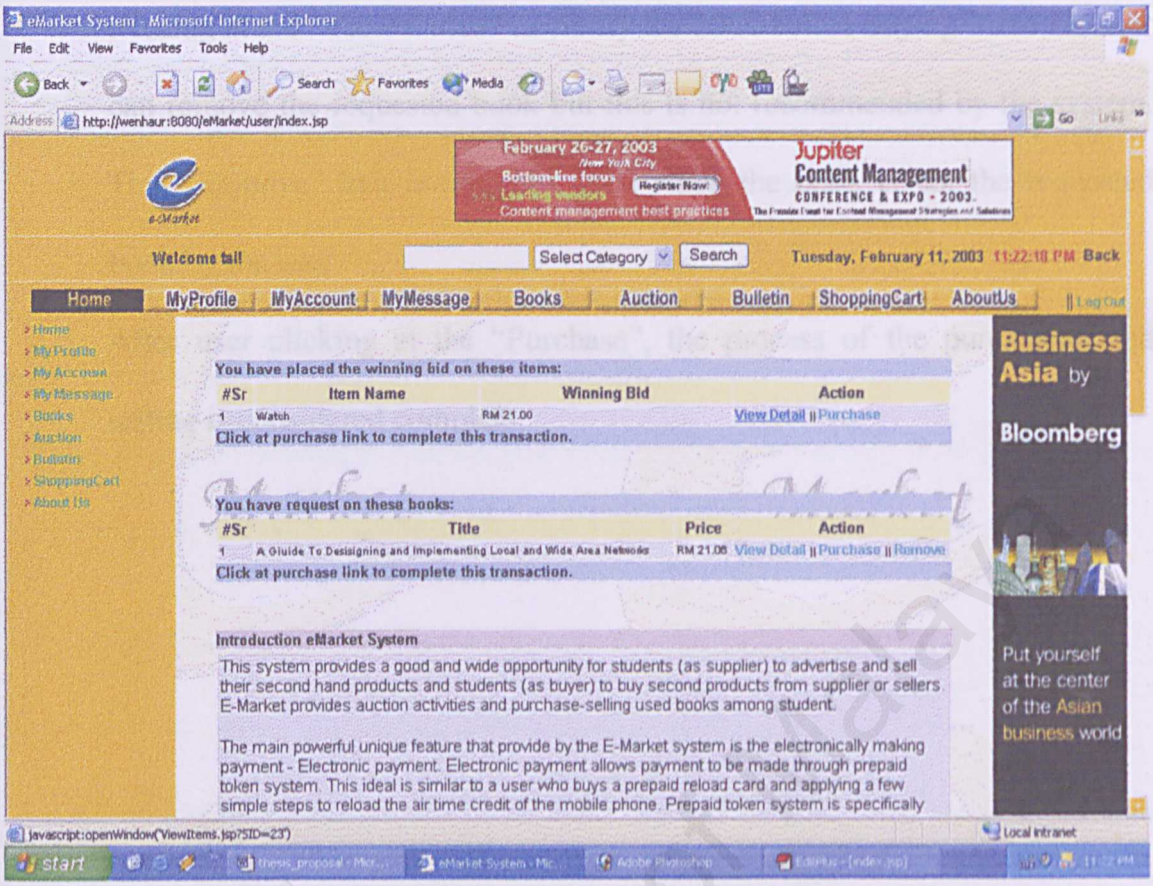


Figure 9.27 Sales Notification

Descriptions of the Figure 9.27:

1. This web page is difference from Figure 9.1 by the 2 notification of the sale to this user.
2. The first table shows that the user had placed a winning bid on this item. The user now is needed to click at the "Purchase" to complete the transaction. User can view the item details by clicking at the "View Detail" to clarify the item before buying.
3. After the user confirming by clicking at the "Purchase", the seller will be notified. The seller and buyer will contact each other to exchange the item and money.
4. The second table shows that the user had request on the particular book. The system had found the book for the user. So user now is needed to click at the

"Purchase" to complete the transaction. User can view the book details by clicking at the "View Detail" to clarify the book before buying. Also the user can remove the requested book but this is not recommended by the system. This "Remove" link is normally used when the book is not the requested book by the user.

5. After user clicking at the "Purchase", the process of the purchasing and selling is considered complete.

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